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ROYAL PHARMACEUTICAL SOCIETY OF GREAT BRITAIN

THE PARIS UNIVERSAL EXHIBITION.

Notwithstanding the diplomatic difficulties that for a time threatened to cast a shadow over the celebration by republican France of its first centenary, the *grande nation* has once more proved equal to the occasion. Ninety-six years ago, when the allied rulers of other European countries threatened France, she "hurled at their feet, as gage of battle, the head of a king." To-day, when the memory of that past has raised against her a light cloud, "small as a man's hand," on the political horizon, she replies with a temple of peace that equals in glory, if it does not eclipse all its predecessors. This may seem exaggeration to those who remember the fine series of exhibitions that have been held in our own metropolis, to say nothing of those that have appeared in the provinces and in other continental cities, but in Paris there has been a conjunction of favourable conditions beyond any perhaps that have obtained elsewhere. The spacious area devoted to the exhibition, with its noble approach from the Trocadero, has lent itself to the innate genius of the French for producing spectacular effect, which has had full play in the colossal Eiffel tower, majestic as a giant, and apparently about as useful, and in the picturesque accessories of the colonial courts. Everything has not, however, been sacrificed to show; there is food for the mind as well as gratification for the eye, though the weak point in this, as in all similar exhibitions, is that, as a rule, the objects most entitled to admiration are those which appeal least effectively to the general public and are appreciated only by the initiated few in the respective departments.

Although it would be out of place to enter here into any detailed description of the arrangement of the exhibition buildings and their contents, a few lines of general explanation may be useful in giving some idea of the extent of the ground covered and the pedestrian work that lies before any enthusiast who hopes to make himself acquainted with all the exhibits in even a single group. In 1878 the exhibits were brought together in buildings arranged with some degree of compactness, though separated by the river and a considerable length of promenade from the principal entrance; but in 1889 there has been added another group of buildings, much nearer the city, and connected by a double band of courts and houses extending along the river front upwards of half a mile. In fact it is estimated that in order to visit all the courts it is necessary to cover a distance of from ten to twelve miles.

Undoubtedly the best and most imposing general view of the exhibition is obtained from the Trocadero palace, from which elevation the spectator's eye can follow the straight lines of a broad promenade, taking in glimpses of subsidiary buildings on either side, until it lights upon the glittering dome of the principal "palace" lying in the distance beyond and dwarfed by the Eiffel tower. This portion of the exhibition occupies the old military parade ground known as the "Champ de Mars," and may be described as an oblong parallelogram, one of the short sides of which is formed by the river Seine and the other by the École Militaire, whilst the long sides are constituted by the Avenue de la Bourdonnais and the Avenue de Suffren. Passing from the Trocadero entrance along a walk running through the palace grounds the Seine is reached and crossed by the Pont d'Jéna, without leaving the enclosure. A little further on stands the Eiffel tower, and the broad promenade, carried between the wide span of its foundation arch, is then continued past two fine groups of fountains and two buildings belonging to the city of Paris to the entrance of the principal "palace." But before reaching that edifice two other handsome domed buildings will have been left behind, one devoted to education on the right and the other to the fine arts on the left. In a line with the fine arts building and reaching from it to the principal "palace" are the courts devoted to Great Britain and her colonies, Belgium, Holland and Denmark; whilst in a corresponding position in the opposite wing are the courts of Italy, Switzerland, United States, Spain, Portugal, Roumania, Servia, Greece, Norway and Japan. Outside these latter in a long continuous line are courts occupied by Uruguay, St. Dominique, Paraguay, Guatemala, Hayti, India, Morocco, Egypt and Persia.

The entrance to the principal building is surmounted by a handsome dome, the proportions of which are sadly dominated by the enormity of the Eiffel tower, so that it is difficult to realize that this dome exceeds in height the towers of Notre Dame and that inside it is lofty enough, within twenty feet, to allow the London "Monument" to stand upright in it. The building is constructed mainly of iron, glass and terra-cotta, and the effect of the colouring and decorations is very fine, the prevailing tints being brown and gold, with the principal girder lines picked out in a pale blue-green side by side with a band of vermillion. The principal nave is nearly one hundred feet broad and running from it transversely are seven galleries or courts on each side. These are devoted almost exclusively to French exhibits, only Russia occupying a portion of a court on one side and Austro-Hungary about as

much on the other. At the end of the nave is another smaller dome, which serves as a vestibule to the enormous machinery hall that constitutes the rear of the exhibition in this direction.

Returning now and standing with the back to the river, there may be seen on the right of the Eiffel tower an irregular group of buildings erected for the exhibits from Brazil, Argentine Republic, Venezuela, Bolivia, Chili, Mexico, as well as the Suez and Panama Courts. Turning to the left a broad avenue follows the Quai d'Orsai, running nearly parallel with the river, and opening with a very interesting series of buildings illustrative of human dwelling-places from the earliest times. After passing these there are, right and left of this avenue, about a dozen buildings devoted principally to agricultural and food exhibits of different kinds, including an English dairy and bakery. The avenue is continued past the Pont d'Alma and the Pont des Invalides, and when it has reached to within a few hundred yards of the Pont de la Concorde it opens upon another but smaller oblong parallelogram, one of the short sides of which is also formed by the river. In consequence, however, of the bend of the river between this spot and the Pont d'Jéna the long sides are inclined at an angle of about forty-five degrees towards the long sides of the larger plot, but nevertheless they do not connect by a considerable distance. In this portion of the exhibition, which is known as the Esplanade des Invalides, are situated, besides a number of departmental displays, the separate buildings of such French colonies as Algeria, Tonquin and Cochin China, as well as an edifice devoted to joint colonial exhibits.

As raw material, at least, may be found in almost any of the buildings on this vast area, and especially in the scattered exhibits from the French colonies, it will be evident from what has been said, if it be intelligible without a map, that shortcomings and omission in a notice of this kind will not be without some excuse. But in addition it must be stated that even in June some of these houses were not yet open, as, for instance, those belonging to Brazil and Cochin China, and that throughout the exhibition there were numbers of unfinished cases and unlabelled specimens, concerning which no information could be obtained from the unusually bald catalogue.

The classification of the exhibits is very similar to that followed in 1878, the primary division being into the following nine groups: (1) Works of Art; (2) Education and Instruction, Apparatus and Processes of the Liberal Arts; (3) Furniture and Accessories; (4) Textile Fabrics, Clothing and Accessories; (5) Mining Industries, Raw and Manufactured Products; (6) Apparatus and Processes used in the Mechanical Industries; (7) Alimentary Products; (8) Agriculture and Pisciculture; and (9) Horticulture. These nine groups are subdivided into seventy-three classes. Of course it is only in comparatively few of these classes that much material is found of special interest to pharmacists; nevertheless, the searcher frequently lights upon such substances in very unexpected association. The most characteristic class is the forty-fifth, occurring in the fifth group, devoted to "Mining Industries, Raw and Manufactured Products," a title not particularly suggestive of "Chemical and Pharmaceutical Products." A somewhat elastic application is also made of this latter title, for it is made to cover acids, alkalies, salts of all kinds; sea-salt and products of inland water industry; various chemical products; wax and fatty substances; soaps and candles; resins, tar, and the products derived from them; essences and varnishes; glue and gelatine; printing inks, coating substances, and blacking; primary pharmaceutical materials; simple and compound medicaments; products of the india-rubber and gutta percha industries; dyes and colours; products from the treatment of minerals for use as lighting materials, and refined petroleum. Another class with a title suggestive of good material is the fifty-first, which is called "Plant used in Chemistry, Pharmacy and Tanning." But the promise is not borne out by experience, for a visit to the machine hall, where the class is located, reveals very little that relates to chemistry or pharmacy. Better results are to be obtained in the forty-second and forty-third classes, which include products of the cultivation of forests and forest industries and spontaneous products, and in the groups devoted to alimentary and agricultural products. Not inappropriately, considering the nature of the present display, although it is very good of its kind, perfumery is again included, as in 1878, in the group devoted to "Furniture and Accessories."

In respect to the first-mentioned branches of science and industry, which are of special interest to the readers of this Journal, it may be said at once that there is little shown that can be described as sensational or novel. The exhibits are good,—more, many of them are of great beauty and interest,—but it can hardly be claimed that any very important advance in chemistry or pharmacy is here represented for the first time. Perhaps the most obvious impression that is borne in upon the mind of the observer is that the practitioner of old-fashioned galenical pharmacy is in France, as in other countries, fast being superseded by the chemical manufacturer on the one hand and the medical confectioner on the other. In fact, it may be remarked, in passing, that an English pharmacist visiting Paris soon finds himself in presence of indications that his French brethren have troubles not unlike his own, for he need not travel far to find exhibited in the window or on the door-post of a pharmacy the French equivalents of "store prices" and "rational charges."

The total number of exhibits included in Class 45 as "Chemical and Pharmaceutical Products," not reckoning those from Brazil, which are to be enumerated in a special catalogue, is 965, of which 437 are contributed by France, 72 by French colonies, 44 by Great Britain, and 412 by other countries. As has been stated, however, the title of the class is made to cover a wide diversity of products. Speaking in general terms, the actual chemistry and pharmacy of the Paris Exhibition is the chemistry and pharmacy of France, and is all to be found in one of the courts on the left side of the nave of the principal building. It is true that there are chemical and pharmaceutical exhibits in the courts of other countries, but these are comparatively few and not often of much importance. When it said that in the British court pharmacy is practically limited to the exhibits of Bishop and Co., Burroughs, Wellcome and Co., Christy and Co., and Oppenheimer Brothers and Co., and

chemistry to the cases of Brunner, Mond and Co., Chance Brothers, and Stevenson, Carlile and Co., and one or two others, it will be understood how little is likely to be found elsewhere.

Turning then first to the French court it will be as well to commence by referring to some of the cases that specially illustrate different phases of pharmacy, and these will form the subject of the next paper.

(*To be continued.*)

NOTE ON THE DILUTION OF COW'S MILK IN INFANT FEEDING.

BY GEO. SMITH, F.C.S.

The following may be of interest as having a bearing on Dr. Rotch's article on this subject published in the *Pharm. Journ.* for March 2, page 706. The writer in September, 1886, had occasion to consider this question in his daughter's case, owing to the mother's deficiency in milk. The food used as a substitute on that occasion has proved so successful in more than one case that it merits recording.

The formula is mainly based on a process devised by Professor Frankland in rearing one of his own children (*vide* 'Experimental Researches,' pp. 843, 844).

In his paper (published December, 1854) Prof. Frankland gives the percentage amounts of the different constituents of human, ass's, and cow's milk as follows :—

	Woman.	Ass.	Cow.
Casein	2·7	1·7	4·2
Butter	3·5	1·3	3·8
Milk-sugar	5·0	4·5	3·8
Salts	·2	·5	·7.

These figures for human and cow's milk differ in several respects from the averages deduced from a wider range of analyses which are quoted by Mr. Thos. Maben in a paper published in the *Pharm. Journ.* for March 23 (pp. 768–769), the most notable differences being those of sugar and fat; but on referring to the *minimum* and *maximum* figures found by Professor Leeds,* from analyses of 80 samples of human milk from different sources, it will be seen that those given by Prof. Frankland provide him with a basis for a formula which produces a fair imitation of human milk from that of the cow.

In this formula Professor Frankland takes no account of the differences in *coagulable* and *non-coagulable* albumenoids existing in each of the respective milks. His process practically consists in a precipitation (by means of rennet) of one-third of the casein from fresh cow's milk, and the addition of one-third more milk-sugar, but this was found by the writer somewhat tedious except to a specially trained person. The process of dilution with water was adopted because it was simpler and would enable the food to be prepared in a few minutes whenever it was required.

Taking Professor Frankland's figures for the average of fresh cow's milk, as quoted, it will be seen that when it is diluted with water in the proportion of 3 parts of the former to 2 parts of the latter the average amount of constituents is modified as follows :

* *Pharm. Journ.*, [3], xv., p. 580.

Fresh cow's milk 3 parts, water 2 parts—

Casein	2·52 per cent.
Fat	2·28 ,,
Sugar	2·28 ,,
Ash	·42 ,,

From these figures the writer compiled the following formula.

The albumenoids, fat, and milk-sugar are by calculation made to approximate as nearly as possible to the average of these constituents in human milk.

Finely gound oatmeal	¼ gradually increasing to ½ oz.
Fresh butter	1 drachm.
Milk-sugar	2 drachms.
Fresh cow's milk	6 fluid ounces.
Pure water	4 fluid ounces.
Salt	5 grains, or a sufficiency.

Mix gradually the water with the oatmeal, milk-sugar, and salt, so that no lumps are formed in the mixture, then add the milk and butter, and heat to the boiling point in a clean, enamelled saucepan. The product should be made up to the measure of half a pint, if necessary, and given lukewarm with a spoon when required.

The oatmeal was introduced as a useful attenuant, and it has been found to act as a laxative, and also as a direct fat and heat-producer in the process of digestion. The process of feeding with a spoon is at first troublesome, but it is to be preferred to the use of a feeding bottle, as, if care be taken to have all the vessels employed scrupulously clean, the infant will enjoy an immunity from thrush (*Oidium albicans*), diarrhœa, and other diseases that follow in their train.

THE COMPOSITION OF TRAGACANTH.

BY JOHN OGLE, M.P.S.

An article headed "The Soluble Gum of Tragacanth," by Professor J. M. Maisch, reprinted in the Journal of March 23 from the *American Pharmaceutical Journal*, suggested that some uncertainty exists as to the composition of this drug. The statements made in the various works on materia medica referred to in that article are so conflicting that it was felt that another investigation would not be out of place. Accordingly an examination was carried out with the object of determining the amount of moisture and soluble gum present; to what extent the soluble portion resembles gum acacia; and the percentage of ash yielded.

A sample of fine Syrian tragacanth, answering to the "characters" of the Pharmacopœia, was obtained through the courtesy of Mr. C. Umney. Of this, 5 grams, maintained at a temperature of 100° C. for twenty-four hours, left a residue weighing 4·054 grams, the loss of ·946 gram being equivalent to 18·92 per cent. of moisture.

The dried gum was powdered : to 3 grams of the powder 250 c.c. of distilled water were added, and the mixture was heated to 80° C. for six hours, in order to effect disintegration. To the resulting semi-fluid mass, which was too viscid to allow of filtration, distilled water was added so as to increase the volume to a litre. After standing for two hours the fluid was thrown upon a wet filter, when a bright, colourless solution, neutral to test paper, was slowly obtained. 100 c.c. of this liquid, representing the soluble constituents of ·3

gram of the dried sample, yielded on evaporation a transparent residue which weighed ·133 gram, equal to 44·33 per cent. of soluble gum calculated for the dried, or 35·94 per cent. for the natural tragacanth. This residue having been ignited left an ash, which, on examination, was found to consist chiefly of calcium and potassium phosphates.

The filtrate answered to the tests given under gum acacia in the Pharmacopœia, the precipitate resulting from the addition of rectified spirit rising to the surface as a transparent gelatinous mass; subacetate of lead produced a white opaque jelly. On the other hand, it differed from arabin in giving a clear solution with borax, and in the absence of precipitates when treated with sodium stannate and sodium silicate; also, by the production of a white precipitate in the presence of neutral lead acetate. After boiling with hydrochloric acid it readily reduced Fehling's solution. Both the soluble and insoluble portions yielded mucic acid when heated with strong nitric acid. The water-insoluble gum readily dissolved in potassium hydrate, whereas lime water appeared to have little or no solvent action.

Two grams of the tragacanth left on ignition ·055 gram of ash, equal to 2·75 per cent., which was partly soluble in water, the dissolved material consisting mainly of the phosphates of sodium and potassium, the insoluble portion containing calcium carbonate, with traces of magnesium salts.

These then are the tabulated percentage results obtained:—

Moisture	18·92
Soluble gum	35·94
Ash	2·75
Insoluble gum (by difference)	42·39
	100·00

No evidence of the presence of starch could be obtained, the iodine test producing no coloration, nor could the official statement that "after maceration in cold water the fluid portion is not precipitated by the addition of rectified spirit" be verified. In fact, as stated above, alcohol at once gave an evident precipitate.

IODINE ABSORPTION AS A TEST FOR THE PURITY OF ESSENTIAL OILS.*

BY H. W. SNOW.

In a hitherto unpublished paper presented to the faculty of the school of pharmacy of the University of Michigan, as a thesis (1884), the writer reported some experiments on the reaction which takes place between iodine, alcoholic solutions of mercuric chloride and turpentine, by which the iodine is decolorized and partly, at least, taken up by the mercury to form iodide of mercury. At that time it was only the nature of the mercury salt which was under investigation. Some few weeks ago while engaged in the examination of a number of samples of oil of peppermint, the earlier work occurred to my mind, and the thought suggested itself that the free manner in which turpentine absorbed the halogens under these conditions might be made the means of determining its presence in other essential oils. The use of iodine absorption as a means of detecting adulteration is not new, inasmuch as Hubl has employed it† for the detection of adulteration in fixed oils, and his process, which the writer used, has been favourably reported on by a number of chemists. The writer had performed a number of experiments in this direction when the work of A. B. Stevens* came to hand, in which that investigator points out that oil of peppermint absorbs iodine quite freely. Mr. Stevens's experiments were performed under somewhat different conditions from my own, and yielded substantially the following results. (1) On adding known volumes of oil of peppermint to known volumes of decinormal solution of iodine made with potassium iodide and with a mixture of alcohol and water for a menstruum that the iodine is decolorized. (2) That on determining the excess of iodide of thiosulphate solution, it was found that the reaction proceeded up to nearly ten minutes, beyond which time no further increase in the iodine taken up occurred. (3) That the presence of alcohol prevented in some measure the absorption of iodine, and that the amount of iodine decolorized increased as the alcohol decreased. (4) That on adding known volumes of oil of peppermint to known volumes of decinormal solution of iodine in *aqueous* potassium iodide and shaking continuously for ten minutes, and then estimating the excess of iodine with thiosulphate solution, that 1 c.c. of oil decolorized 30 c.c. of N—10 solution of iodine. (5) That when these figures are calculated into parts by weight 100 parts of oil absorb about 42 parts of iodine. In my own experiments I followed Hubl's process without modification, as I had already noticed in my earlier experiments that mercuric chloride facilitated the absorption of the halogens. The process is as follows:—

Introduce into a tared flask having a capacity of about 60 c.c., 0·100 to 0·250 grams of the oil to be tested and obtain the exact weight taken. Dissolve in 10 c.c. of chloroform and add from 10 to 40 c.c. solution of iodine and mercuric chloride prepared as directed below, noting the exact amount introduced. The amount of iodine solution added must be such that after standing an hour or so the solution will have a distinct iodine colour as the iodine must always be in quite decided excess. If the first portions are decolorized more may be added. After the solution has stood from forty to forty-eight hours add 5 to 10 c.c. of strong solution of potassium iodide and about 125 to 150 c.c. of water, titrate at once with decinormal solution of sodium thiosulphate, adding towards the last freshly-prepared starch solution as an indicator.

	Time of digestion.					
	3 hours.	6 hours.	15 hours.	24 hours.	40 hours.	48 hours.
Oil peppermint . .	21·1	22·8	24·5	—		
,, ,, . .	—	—	—	—	179	179
,, ,, . .	—	—	—	—	110	110
,, ,, . .	—	—	—	—	120	126!
,, bergamot . . .	—	—	300	—	—	345
,, orange peel, bitter	—	—	321	—	—	362
,, turpentine . .	291	333	245	353	—	397

Calculate results to the basis of the amount of iodine absorbed by 100 parts of oil. The solution of iodine is made by dissolving 25 grams of iodine in 500 c.c. of alcohol and 30 grams of mercuric chloride in an equal amount of the same solvent. Mix the two solutions and after twelve hours filter. Inasmuch as the strength of this solution is subject to considerable alteration in strength on standing, it should always be determined at the same time the titrations are made of that added to the chloroform solution of the oil. It

* From *The New Idea*, March.

† Allen's 'Com. Organic Analysis,' 1886. Vol. ii., p. 48, from *Journ. Chem. Soc.*, iii., p. 641.

* 'Proc. Amer. Phar. Assoc.,' 1888, 97, *Amer. Drug.*, Oct., 1888, 192, and other English reprints.

is essential that after diluting the solution with water it should be titrated at once, as the compounds formed are extremely unstable as a rule, and on standing, iodine soon begins to be liberated, so that the solution again acquires purplish to blue tint. Some comparative experiments running from three to forty-eight hours show that about forty hours must elapse before the absorption of iodine is complete, and sometimes then it does not seem to be so.

The following figures show the results and relate to the number of parts of iodine which 100 parts of the oil will absorb in the time specified :—

	Time of digestion.		
	6 hours.	15 hours.	40 hours.
Oil peppermint*	23·	24½	—
„ „ (adulterated)	84·7!	74·1!	—
„ „ „	88·3!	73·6!	—
„ „	—	—	179
„ „	—	—	109
„ „	—	—	67
„ „	—	—	71
„ „	—	—	106
„ „	—	—	105
„ „ Japanese	—	—	64
Menthol	none.	—	—
Oil bergamot	—	—	345
„ limes	—	—	289
„ lemon	—	—	343
„ orange (bitter)	—	—	362
Methyl salicylate (synthetic oil wintergreen)	—	—	—
	—	¾	—
Oil sweet birch (sold as oil wintergreen)	—	—	—
	—	¼	—
Oil wintergreen (true)	—	1	—
„ anise	—	—	121
„ coriander	—	—	385
„ caraway	—	—	233
„ thyme	—	210!	183!
Thymol	—	201!	181!
Oil lavender	—	—	286
„ cloves	—	—	467
„ sassafras	—	—	166
„ pennyroyal	—	—	152
„ camphor	—	—	129
Camphor	—	¾	—
Oil turpentine (fresh distilled)	—	—	397
„ erigeron	—	—	280
„ copaiba	—	—	250

The writer's experiments thus far indicate that the iodine absorption of essential oils may yield figures having a considerable value in the determination of the purity of oils, but it is of course not likely that these figures are constants, except perhaps in a few instances, any more than the specific rotatory power, specific gravity, etc., are constant. There are also some anomalies which need clearing up, and it is necessary that maximum, minimum and average equivalents should be determined by making estimates with a number of samples of the same oil and of unquestionable purity. The only direct application which the writer has yet made of it is in the detection of turpentine in oil of peppermint with a partial application to the detection of oil of copaiba, accounts of which are given elsewhere (see *Pharmaceutical Journal*, June 29, p. 1056).

* An unusually fine article purchased four or five years ago.

BISMUTHYL IODIDE.

*Comparative Value of Methods Proposed Heretofore, with an Improved Method for its Preparation.**

BY CHARLES E. GREEN.

Bismuthyl iodide was introduced into hospital practice in New York by Dr. A. Sidney Reynolds about ten or twelve years ago under the name of "Bismuth-subiodide or oxyiodide." It was used for the local treatment of chronic ulcers, syphilitic sores, eruptions, etc. It was said to be more efficient than iodoform, with none of the saffron-like and almost intolerable odour so characteristic of the latter. Dr. Reynolds also claims that it will "control inflammation, allay irritation, suppress suppuration, promote granulation, and induce cicatrization;" and that it is "almost a specific in gonorrhœa and general mucous inflammations," etc. Internally it is strongly recommended in gastric ulcers, gastritis, and typhoid fever.

The objects had in view in the prosecution of the work as presented by this paper were, first, to ascertain the amount of true BiOI in the commercial article sold by the name "Subiodide of Bismuth;" secondly, to test the various methods proposed for the manufacture of the compound, and also to ascertain the percentage found in the products obtained by these methods; and thirdly, to devise, if possible, a new method for its preparation that would yield a better result than any as yet known to myself.

The information which I was able to obtain, both as to the effect and as to a satisfactory mode of preparing bismuthyl iodide, was not only very meagre, but very unsatisfactory indeed. Although considerable has been written on the mode of preparation, yet, after a great number of experiments, no one seems to have obtained a thoroughly satisfactory result. None of the products obtained were of sufficient purity, and none of the methods employed were without some serious objection, yet these investigations were made by some of the best pharmacists in our land. How far I may have been successful in my efforts in this direction I leave for others to judge. At the time of Dr. Reynolds's experiments the high cost of the compound prevented its general adoption; therefore the main point for consideration was a process by which a chemically pure compound could be obtained at a price sufficiently reasonable to bring it into general use.

The first commercial sample which I examined was of a very dark brown, almost chocolate colour, with nothing of the characteristic brick red colour which it should have, indicating the presence of a considerable quantity of iodine in other form of combination than BiOI, most probably as BiI_3. When boiled with an excess of water it assumed a much lighter colour, finally a bright brick red, owing to more perfect oxidation, one atom of oxygen from the hot water replacing two of iodine forming a molecule of BiOI. When heated to 100° C. no apparent change took place, only a slight odour of iodine becoming perceptible. As the heat was slowly raised to cause partial decomposition, and as the iodine was slowly liberated, the compound gradually assumed the brick red colour. By analysis I found that it contained 48·36 per cent. of iodine, or about 12 per cent. more than a pure article should contain, and we may justly draw the conclusion that this is a very indefinite and, therefore, unsatisfactory compound.

The next sample examined was, like the first, of American manufacture. It was dark red in colour, dense and heavy, and exhibited a few lumps of a lighter colour. It contained 91·83 per cent. BiOI, with a small amount as $BiONO_3 \cdot H_2O$. One other sample was examined, but it did not differ from the one just spoken of, except that it had been more carefully powdered and contained 92·61 per cent. BiOI, and a small proportion of $BiONO_3 \cdot H_2O$.

* From the *American Journal of Pharmacy*, April.

Of the various processes set forth in journals and books of reference, I have tried several with varied success. The first tried was the so-called method of "precipitation," proposed by Jos. W. England, in the *American Journal of Pharmacy*, Jan., 1887, pp. 9-15 The product by this process was of a fairly good colour, but slightly darker than some other specimens, cakey, and very difficult to pulverise finely. The chief disadvantages of this method are, that the water being hot and the acid solution not being sufficiently diluted, a very appreciable quantity of iodine was liberated as vapour, giving the supernatant liquor a distinctly violet colour, and readily recognizable both by the odour and by the starch test. By analysis I found the compound made by this process to contain 97·65 per cent. of BiOI.

The next method was devised by R. Rother (*Amer. Jour. Phar.*, Aug., 1887, pp. 390-391). Theoretically this is certainly a good method. It yields a product of a dark red colour, heavy, dense, and rather hard to pulverize finely. It contains 95·3 per cent. BiOI, with 3 or 4 per cent. $BiONO_3 \cdot H_2O$; but, to say the least, the process is rather tedious and the resulting compound not so satisfactory as desired.

The next method tried was that of precipitation with hydriodic acid and freshly prepared bismuth hydroxide, as proposed by Frank X. Moerk (*Amer. Jour. Phar.*, June, 1887, pp. 273-274). The author states, "the oxyiodide so obtained is of very fair colour, and contains no water of crystallization." In this product, as in all others which I examined, I found no water of crystallization. That which I obtained was very tough, almost unpulverizable, heavy and cakey. So far as chemical composition is concerned it was as good as the average samples found upon the market, containing 92·9 per cent. BiOI, with some $BiONO_3 \cdot H_2O$, as in the others. But the process not only occupies too much time, but requires a great deal more skill and care than is necessary to produce a very much better article.

The next process tried was devised by the same author as the preceding one, and consists in boiling certain quantities of $BiONO_3 \cdot H_2O$ and KI together without the presence of an acid; and, as the preceding one was remarkable for being complicated, so this one is justly celebrated for being extremely simple. In devising these manipulations the author has surely touched both extremes. "The (supposed) *advantages* of this method are, first, the avoidance of *free acid*; second, its definite composition; third, a higher percentage of BiOI." The first advantage (?) I readily admit; there certainly is no *free acid* present. Yet this could be considered a good method provided the two latter advantages claimed were true for the resulting compound. The samples made by myself, after boiling for more than an hour, were found to contain only 27·6 per cent. iodine, making the resulting compound represent 76·66 per cent. BiOI, with a large amount of $BiONO_3 \cdot H_2O$, showing conclusively that large quantities of KI remained undecomposed and were lost in the washings, and that there is nothing "definite" in its composition. The washings, when tested with a solution of $AgNO_3$, gave a copious white, curdy precipitate of AgI.

Several samples were made by various other methods, as by "trituration," etc., but none of these were satisfactory, having various percentages of BiOI, from 88 to 95 per cent., with "*uncertain*" quantities of $BiONO_3 \cdot H_2O$, differing in no special way from those already spoken of.

Of all the methods so far considered I had found no one that was entirely satisfactory. The method of "precipitation" seemed to be in all respects better than any of the others, yet it was far from being perfect. In experimenting upon this process I found that it should be modified as follows: Dissolve 409 grs. $BiONO_3 \cdot H_2O$ in 1 fluid ounce HNO_3 with the aid of heat, as is stated in Mr. England's formula; then carefully dilute this solution with water as long as $BiONO_3$ is not reprecipitated, or, at least, until it has assumed a slight permanent opalescence. Add to this 221 grs. of KI, dissolved in about 16 fluid ozs. of *cold* water, in a large flask or some suitable vessel, agitate thoroughly, and *then* apply heat, *but not to the boiling point* (about 80°-85° C.). The mixture at first assumes a black colour, growing gradually brownish, becoming still lighter as it is agitated, and under the influence of *moderate* heat and violent agitation it is finally changed from a light brown to a brilliant red. The agitation is continued for a few moments longer that the reaction may be completed. The precipitate is washed by decantation, drained upon a plain filter and dried at 100° C. The yield should be about 470 grs. The whole operation is completed in a very short while. No iodine is liberated, and hence the product contains a larger and proper percentage of it, and represents a pure article of BiOI.

Bismuthyl iodide so obtained is of a very bright red colour, almost vermilion, and has the additional advantage of being in very fine powder, light and bulky, admirably adapted for use as a dusting powder or dressing, an advantage possessed by none of the other specimens. By analysis I found it to contain 35·8 per cent. of iodine, making 99·44 per cent. BiOI, with only ·35 per cent. $BiONO_3,H_2O$.

The reaction taking place in the above is most likely as follows:—

(1) $BiONO_3 \cdot H_2O + 2HNO_3 = Bi\,3NO_3 + 2H_2O$.

(2) $3(Bi\,3NO_3) + 3KI = BiI_3 + 2(Bi\,3NO_3) + 3KNO_3$.

(3) $BiI_3 + 2(Bi\,3NO_3) + 3H_2O = 3BiOI + 6HNO_3$.

The mode of analysis which was pursued in these experiments is as follows:—

For Estimation of Iodine.—Place 0·5 gm. BiOI in a flask with a few pieces of test zinc, cover with water, and mix thoroughly, then add sufficient H_2SO_4 to evolve hydrogen slowly, at the same time decomposing the BiOI. Thus H combines with I to form hydriodic acid, while $ZnSO_4$ is formed and Bi is precipitated in black flocculent masses. This reaction is completed in two or three hours. Neutralize the resulting mixture carefully with KHO, add a few drops of solution K_2CrO_4 as an indicator; titrate with one-tenth normal solution of $AgNO_3$ until a red precipitate begins to form. The percentage of iodine is then calculated as by U. S. P. process.

For Estimation of Bismuth.—Dissolve 0·5 gm. BiOI in a small quantity of nitric acid, dilute with water boil until all iodine has been vaporized and all odour of HNO_3 has disappeared; add to this KHO, until a precipitate is formed which does not redissolve on shaking. Collect on a plain filter, wash well, ignite and weigh as Bi_2O_3.

LEPTOTRICHIC ACID.

Under this name Herr J. Amaun records the first example of a crystallizable product obtained from the Muscineæ. He procured it from *Leptotrichum glamescens*, Hpe., the glaucous appearance of which moss is caused by a white scurfy coating which protects it from the action of water like a coating of wax. He finds this substance to be very soluble in ether, chloroform, or hot alcohol of 90 p. c. The concentrated solution in ether has an acid reaction, and the acid crystallizes out on evaporation in the form of prismatic needles. It is distinguished by its powerful resistance to concentrated sulphuric and hydrochloric acid, which scarcely affect it, nor is it attacked by caustic alkalies in the cold. The author finds this substance present in the green parts of the moss to the extent of 13 p. c. of its weight. No chemical formula is given.

The Pharmaceutical Journal.

SATURDAY, JULY 6, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

THE last meeting of the Council was attended by nineteen of its members, the absentees being Mr. SOUTHALL and Mr. WATT. The most important part of the proceedings was the discussion that took place after the report of the Building Committee had been presented. In reference to the recommendation of that Committee to accept the tender sent in by Messrs. KIRK and RANDALL, the President pointed out that though the amount of the estimate for the new building was in excess of that based upon the sketch plans submitted some time ago the increase was not more than about six hundred pounds. This was shown to be partly in consequence of the decision to cover more of the back space than was at first intended, and partly also of the requirement on the part of the Duke of Bedford's agent that the sanitary accommodation provided for the new building should be of a more ample description. This increased expenditure was therefore unavoidable, but in other respects the careful control exercised by the Building Committee over this undertaking was shown by the reduction that had been made in the builder's estimates to the extent of nearly two thousand pounds by omitting certain details of an ornamental character, though without in any degree detracting from the substantial quality of the new building. It may, of course, be found that these estimates are liable to be supplemented, as is so frequently the case in building operations, by requirements that have not been ascertained, such, for instance, as those connected with the condition of the party walls, but the uncertainty in this respect is no more than usual, and the report of the Committee appears to give evidence of every possible care having been taken to limit the expenditure to the utmost that is consistent with efficiency, and to ascertain as far as can be done the extent of the outlay incurred.

The suggestion brought forward that the reports of Committees should be sent round to members of the Council together with the agenda paper, upon the assumption that such a plan would facilitate the discussion of the subjects referred to, did not meet with much approval from the Council. It was shown by the President that as most of the Committees meet on the day before the Council meeting, to suit the convenience of members coming from the country, it is only the report of the Library, Museum, Laboratory and House Committee that could be circulated as proposed. The report of that Committee is generally very long and full of detail, since a good deal of formal routine work is done by the Committee. Moreover, when any proposition brought forward is of a special or abnormal character it is competent for any member to move that its consideration be postponed for a month, and as that plan is usually adopted in such instances, ample opportunity is thus afforded for members of Council to get a grasp of the work of the Society entrusted to that Committee. As regards other committees, any member of the Council wishing to know what has been done, can consult the minute-book before the sittings of the Council, and can thus readily put himself in possession of what he desires to know. A committee that undertakes to deal with, and present a report upon, any part of the Society's business, is, moreover, entitled to the confidence of the other members of Council, without there being any ground for apprehension that their freedom of action would be interfered with. The Solicitor's report of progress in certain law cases was, as usual, dealt with by the Council in Committee, and the reports of the Finance and Benevolent Fund Committees, recommending the temporary investment of the legacy left by Mr. JOHN WILLIAMS and the payment of certain grants to widows of registered chemists were adopted. As a further feature of the latter report it was stated that the feeble health of two of the ISHERWOOD orphans had much interfered with the endeavours to furnish them opportunities of earning their living, though the third child is now doing very well. The important subject of local secretaries was again dealt with in the report of the Library, etc., Committee, and the proposed list of appointments submitted was adopted, but the further question as to the services to be required of local secretaries in future is still under consideration. It seems probable that a recommendation will be made to relieve local secretaries of the inconvenient and somewhat irksome duty of collecting subscriptions and confine it entirely to the London office. On the recommendation of the same committee it was resolved that the Society's written examinations shall be held in the same centres as last year and that the appointments as superintendent shall be offered in the first instance to the local secretaries, except in London and Edinburgh.

Among the other subjects brought before the Council mention may be made of the Medical Acts Amendment Bill, introduced into Parliament by Sir WALTER FOSTER, which turns out to be a much

less formidable affair than it appeared to be according to a recent prophetic report. It is simply intended to empower medical corporations to hold special examinations and grant diplomas and titles in relation to State medicine, sanitary science, and public health, and to provide for the registration of such titles. Reference was also made to a circular that has been issued by the organizing Committee appointed to make arrangements for an International Pharmaceutical Congress in Milan. This project has hitherto miscarried, and notwithstanding somewhat positive assurances that the Congress would be held this year, it is now deferred until 1890. As the arrangements have now advanced to the stage of requesting those who intend to become members of the Congress to apply for registration as such and remit ten francs, it may be anticipated that there is a somewhat better prospect of its realization. Pharmacists who intend to take part in this Congress must make application for membership before the 30th of November, and forward at the same time an introduction from a pharmaceutical association or from an administrative authority that has control of the public health. This plan appears to have been adopted as the alternative to sending definite personal invitations, and though it may possess in some respects advantages over the latter it may be doubted whether it is likely to be equally successful in securing a good attendance.

The Local Secretaries for the forthcoming meeting of the British Association, Newcastle, have issued circulars stating that they are requested by the Local Executive Committee to invite the attendance of members at the meeting which will be held there from the 11th to the 19th of September next, under the presidency of Professor Flower, C.B., F.R.S., etc., the Director of the Natural History Department of the British Museum. This will be the third meeting of the British Association held in Newcastle, the previous ones having been in 1838 and 1863, both of them having been highly successful, and the largest in point of numbers up to their respective dates. To pharmacists the last meeting was of special interest, as having been the occasion on which the formation of the British Pharmaceutical Conference took place, and the approaching meeting in September will also have an attraction for them, as the Conference has, with the exception of two years, followed the larger body to its annual place of meeting. Of the features of interest of Newcastle we will not now say more than that they, as well as the facilities for such meetings, are described as having increased since 1863. Special committees have been engaged for some time past in organizing excursions to places of interest in the district and in preparing to meet the wants of visitors in regard to lodging and hotel accommodation. Those who desire information on these matters should apply to the Local Secretaries, Professors Bedson and Merivale, at the Literary and Philosophical Society, Newcastle-upon-Tyne.

* * *

It will be seen from our obituary notices this week that the Society has lost in Mr. James Crispe an old member and former auditor.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, July 3, 1889.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Evans, Gostling, Greenish, Hampson, Harrison, Hills, Leigh, Martin, Martindale, Newsholme, Richardson, Robbins and Schacht.

The minutes of the previous meeting were read and confirmed.

Retirement of Mr. Savage.

The PRESIDENT said a letter had been received from Mr. Savage, expressing his thanks for the resolution passed last month, and the expressions which had accompanied it.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Allen, Willie.
Barker, Joseph.
Carman, Frederick Henry.
Dennis, Fred Woodrow.
Duffin, Charles William.
Gardner, John.
Heap, Isaac Henry.
Neville, Thomas Crofts.
Saville, Edwin.
Tharratt, George Row.
Vincent, John.
Wansbrough, Edwin George Lincoln.
White, Thomas Arthur.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following having passed the Major examination, and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Barker, Joseph.....Nottingham.
Dennis, Fred Woodrow .....Louth.
Gardner, John .....Bolton-le-Sands.
Neville, Thomas Crofts .....London.
Rimmington, George .....Bradford.
Wansbrough, Edwin G. Lincoln Barrow-in-Furness.
White, Thomas Arthur .....Basingstoke.

ASSOCIATES IN BUSINESS.

The following having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Cook, Thomas Marsden .....Hindley.
Gray, John Johnston .....Cults.
Johnson, William Wilson .....Llandrindod Wells.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as "Apprentices or Students") their subscriptions for the current year, were elected "Associates" of the Society:—

Bonnett, Frederick .....Doncaster.
Cheney, Henry Robert .....Banbury.
Cowie, William Beaverly .....Mains of Newrain.
Negus, John Henry..... Northampton.
Parker, Robert.....Rishton.
Pilkington, William .....Buxton.
Rees, David Charles .. ..Ipswich.

Tapp, Charles .....Sittingbourne.
Taylor, Joseph John .....Sittingbourne.
Thorp, Edwin .....Harrogate.
Thursfield, John Henry .....Kettering.
Twigg, Paul O'Brien .....Bath.
Walwin, Walter .....Warminster.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination, and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Bartle, William Thomas .....Heckmondwike.
Chappelow, Thomas Henry ...Southampton.
Davies, Daniel Evan .....Carmarthen.
Dey, Alexander John.....Edinburgh.
Dryden, Thomas .....Landore.
Middleton, James .....London.
Shirtliff, Wm. Edward Daniel.London.

Reports of Committees.

FINANCE.

The report of this Committee recommended the usual payments and the purchase of £100 stock on the Benevolent Fund account.

The PRESIDENT, in moving the adoption of the report, said the principal receipts during the month had been from examination fees. On the Benevolent Fund account there had not been many subscriptions received, but the legacy from the late Mr. John Williams of £100 had been paid, and it was recommended that that be invested. When the amount invested on this reached a substantial sum, it would be proposed that the Committee should look out for an investment in ground rents, so as to produce 4 per cent. instead of the small interest obtained from Consols.

The motion was unanimously agreed to.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (aged 59) of a member and subscriber, and one of the unsuccessful candidates at the last election of annuitants. (Lincolnshire.)

£10 to the widow (aged 40) of a registered chemist and druggist, who subscribed to the Fund for 7 years. Applicant's husband died in April last, insolvent, having been in bad health for some time previously. There are six children, the eldest twelve years old. (Yorkshire.)

£5 to the widow (aged 42) of an associate in business and subscriber, who endeavours to support herself by needlework. She had a grant of £5 in June, 1888. (Warwickshire.)

£5 to the widow (aged 62) of an associate and member from 1842 to 1856, who had a grant of £5 in 1861, and who died last month. Applicant is in feeble health and mainly dependent on her children, one of whom is now out of employment. (London.)

One application the Committee had declined to entertain, and two had been deferred for further information.

The Isherwood Orphans.

Mr. Houghton had attended the Committee and reported on the condition and prospects of the two boys living with him.

The VICE-PRESIDENT, in moving the adoption of the report and recommendations, said they were of the usual character and called for no special remark. With reference to the Isherwood children, Mr. Houghton had attended the Committee and reported that the boys were going on well, barring their feeble condition of health, which was the old story they had heard all through. Both boys appeared to be in very delicate health, and not equal to battle with the world in the ordinary way. The elder one, who was an ironmonger's assistant, had had to return home a week ago owing to an attack of ill health. The younger one had also been obliged to leave his employment in consequence of the state of his health. The girl, who had been taken charge of by a friend in Hull, appeared to be the most robust of the family, and was doing very well. In the case of one of the applications, which had been deferred, his attention had been called to a published statement by the applicant when before the Bankruptcy Court that the Pharmaceutical Society was going to keep him when he had passed his examination. If the applicant had made such a statement he would take that opportunity of undeceiving him. The Committee could not entertain his case whilst the bankruptcy proceedings were pending, but had informed him that when they were over any fresh application he might make would be considered. So far, however, as providing for him for life, the Committee had no such idea.

Mr. GREENISH remarked that the statement with regard to the Isherwood children was very important, and should he thought be taken into consideration by the Committee. The Society had given these children an opportunity of earning their living, and now it was found that their condition of health was such that they could scarcely avail themselves of it.

Mr. HAMPSON did not think a similar course would be adopted again.

Mr. ROBBINS thought from the experience of this case the Committee would not be likely to repeat it.

Mr. ATKINS said the Committee had had a long conversation with Mr. Houghton, who had been extremely kind to these boys. The elder boy, although in delicate health, was practically off their hands, and Mr. Houghton did not intimate that any further application would be made on his behalf. With regard to the younger boy he seemed to have broken down more completely, and Mr. Houghton was anxious to change his occupation, and came to the Committee for advice. Practically there was only this boy to look after, and it was hoped that he would soon be off their hands entirely.

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
May	Day . .	546	28	12	20
	Evening .	250	16	6	11

Circulation of books.	Town.	Country.	Total.	Carriage paid.
May	219	155	374	£1 19 7½

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

For the Library in London—

Boyle (R.), Chymista scepticus, 1662.
From Mr. W. H. SYMONS.

University of London, Calendar, 1889.
From the UNIVERSITY.

Mathematical questions, with their solutions, edited by W. J. C. Miller, vol. 50, 1889.
From the EDITOR.

Middlesex Hospital, Reports for 1887.
From the HOSPITAL.

New Zealand, Pharmaceutical Register for 1889.
From the PHARMACY BOARD.

India, Revenue and Agricultural Department, Selections from the Records, by the Reporter on Economic Products, Nos. 1–4, 8-16, 1888–89.
From H. M. SECRETARY OF STATE FOR INDIA.

†

Digest of Criticisms on the United States Pharmacopœia, 1880, part 1.
From the CHAIRMAN OF THE COMMITTEE OF REVISION AND PUBLICATION.

Flückiger (F. A.), Strychnos Ignatii, 1889.
— Ein zweckmässiger Extraktionsapparat, 1889.
— Zur Kenntniss des Copals, 1889.
Gerock (J. E.), Trennung des Strychnins vom Brucin, 1889. From PROFESSOR FLÜCKIGER.
Raue (B.), Untersuchungen über ein aus Afrika stammendes Fischgift, 1889.
Rymsza (A.), Ein Beitrag zur Toxikologie der Pikrinsäure, 1889. From Professor DRAGENDORFF.
Cros (T.), Étude micrographique du poivre noir et de ses falsifications, 1889.
Galinier (H.), Étude sur la lanoline, 1888.
Grimal (E.), Étude sur les différents procédés employés dans la détermination de l'astigmatisme, 1889.
Jadin (F.), Les organes sécréteurs des végétaux et la matière médicale, 1888.
Marty (A. P.), La pharmacie à Montpellier, 1889.
Planchon (L.), Étude sur les produits de la famille des sapotées, 1888.
Robert (J.), Le chloroforme au point de vue pharmaceutique, 1889.
Sambuc (C.), Contribution à l'étude de la flore et de la matière médicale de la Sénégambie, 1887.
From Professor J. L. SOUBEIRAN.
Belzung (E. F.), Recherches sur l'ergot du seigle, 1889.
— La chlorophylle et ses fonctions, 1889.
Bourquelot (E.), Des fermentations dont les produits sont utilisés en pharmacie, 1889.
Bouvier (E. L.), Le système nerveux des crustacés décapodes et ses rapports avec l'appareil circulatoire, 1889.
— Les cétacés souffleurs, 1889.
Brunotte (C. M. G.), Des fruits utiles de pipéritées, 1889.
Devaux (H.), Généralités sur les sirops et les mellites, 1889.
Herail (J.), Développement des organes reproducteurs et formation de l'œuf chez les phanérogames, 1889.
From the ÉCOLE SUPÉRIEURE DE PHARMACIE DE PARIS.

The Committee recommended the purchase of the undermentioned works:—

For the Library in London—

Meldola, Chemistry of Photography.
Bouchardat, Formulaire magistral, 1889.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
May	Morning	528	41	9	19
	Evening	167	16	1	6

The following donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Microscopic slides of aconite root stained, unstained, and showing the alkaloid *in situ*, also slides of crystallized aconitine and its nitrate, and a series of photographs in illustration of the same.
From Messrs. E. RICHARDS and F. A. ROGERS.
Specimen of Selenium oxide, in fine crystals.
From Mr. A. J. SIMONS.
Specimens of the fruit of *Balanites Roxburghii*, of the gum-resin of *Balsamodendron Berryi* and of Masamba or Indian aloes containing iron slag as an adulterant.
From Mr. D. HOOPER, Ootacamund.
Specimen of Farnham hops.
From Mr. W. W. CRISP.
A log from a trunk of *Pinus australis*, showing the method of chipping the trunk and boxing the turpentine.
A specimen of the stem of *Abies balsamea*, showing the vesicles containing the balsam.
Specimen of the fruit and leaves of *Sophora speciosa*.
From the PRESIDENT OF THE PHILADELPHIA COLLEGE OF PHARMACY.
Specimen of balsam of *Liquidambar styraciflua* from Nicaragua. From Mr. T. O. SANDELL.
Specimen of gold reef in which gold is found in the Transvaal.
From Mr. HERBERT ST. JOHN TUGMAN.

To the Society's Museum in Edinburgh—

Specimen of barbaloin and socaloin.
From Messrs. T. and H. SMITH and Co.
Specimens of the leaves of *Hamamelis virginica*.
From Mr. D. T. MACDONALD.

The staff of the Society's School had attended and reported on their respective classes.

The Committee recommended that any necessary repairs and cleaning be done during the vacation under the order of the President.

At a second meeting of the Committee the list of local secretaries for the ensuing year had been agreed to and was recommended for appointment.

The PRESIDENT, in moving the adoption of the report, said a paragraph would be added to it which had been omitted on the subject of the local secretaries. It would be remembered that there had recently been a discussion on this subject, and it was referred to the Committee for consideration. Not being desirous of coming to a hasty decision the Committee had adjourned it with the hope of getting as much information as possible from members living in the country. The opinions expressed at the Council meeting were being duly considered by the Committee, but the report would not be ready for some little time, as it was very desirable to consider the subject in all its bearings. One point on which a strong feeling had been expressed was that it was invidious and inconvenient in some respects that the local secretaries should be called upon to collect subscriptions, and probably a recommendation that this duty should be left to the London office would ultimately be made. The appointment of the local secretaries for the year would form the subject of a separate resolution, but he might say that the result of the present election, as on former occasions, had been to show that very little interest was taken in the matter by the voters themselves in many districts.

The report and recommendations were unanimously adopted.

LIST OF LOCAL SECRETARIES, 1889–1890.*

The following gentlemen were by a subsequent resolution appointed Local Secretaries for the ensuing year:—

Towns eligible.	Names of persons appointed.
Aberdeen	Strachan, Alexander.
Aberystwith	Wynne, Edwin Price.
Abingdon	Smith, William.
Accrington	Stanley, Thomas.
Altrincham	Clarke, James Thomas.
Andover	Bienvenu, John.
Appleby	Longrigg, John.
Arbroath	Burn, David Haitly.

* Local Secretaries are appointed in all towns in Great Britain (except London and Edinburgh) which return a Member or Members to Parliament, and in such other towns as contain not less than three Members of the Society or Associates in Business.

Towns eligible.	Names of persons appointed.
Ashbourne	Osborne, James.
Ashby de la Zouch	Bullen George Wm.
Ashford	Ingall, Joseph.
Ashton-under-Lyne	Bostock, John W.
Aylesbury	Turner, John.
Ayr	
Banbury	Ball, George Vincent.
Banff	Alexander, William.
Bangor	Jones, Owen.
Barnsley	Badger, Alfred.
Barnstaple	Goss, Samuel.
Barrow-in-Furness	Chapman, Leonard P.
Basingstoke	
Bath	Appleby, Edward J.
Bedford	Taylor, James B.
Belper	Calvert, James.
Berwick	Lyle, William.
Biggleswade	Evans, John.
Bilston	Gray, Charles.
Birkenhead	Brookes, Alfred Fincher.
Birmingham	Southall, Alfred.
Bishop Auckland	Thorburn, Hy. Wm.
Blackburn	Garland, Alfred P.
Blackpool	Laurie, John.
Bodmin	Cardell, Richard T.
Bolton	Mason, William B.
Boston	Haller, Frederick Wm.
Bournemouth	Duncan, Alexander.
Bradford (Yorkshire)	Rimmington, George.
Brechin	Hodgeton, David.
Brecon	Meredith, John.
Bridgend	Jenkins, David.
Bridgnorth	Deighton, Thomas Milner.
Bridgwater	Basker, John Anthony.
Bridlington	Purvis, John Bowlt.
Brighton	Gwatkin, James Ross.
Bristol	Stroud, John.
Bromley	
Broughty Ferry	Park, William.
Burnley	Cowgill, Bryan H.
Burslem	Blackshaw, Thomas.
Burton-on-Trent	Wright, George.
Bury	
Bury St. Edmunds	Summers, Frank.
Buxton	Wright, Robert.
Camborne	Fiddick, Thomas.
Cambridge	Deck, Arthur.
Canterbury	Bing, Edwin.
Cardiff	Munday, John.
Carlisle	Thompson, Andrew.
Carmarthen	Davies, Richard Morgan.
Carnarvon	Jones, John.
Chatham	Crofts, Holmes C.
Chelmsford	Metcalf, Wilson.
Cheltenham	Barron, William.
Chertsey	Boyce, George.
Chester	Baxter, George.
Chesterfield	Windle, John T.
Chichester	Long, William Elliott.
Chippenham	Coles, John Coles.
Chorley	Hill, William.
Christchurch	Green, John.
Cockermouth	Cooper, F. Ashley.
Colchester	Cordley, William Bains.
Coventry	Hinds, James.
Crewe	Harrop, Wm. H.
Croydon	Clarke, Josiah.
Darlington	Robinson, James.
Dartford	
Deal	Green, John.
Denbigh	
Derby	Cope, John A.
Devizes	Edwards, Thos. Roberts.
Devonport	Codd, Francis.
Dewsbury	
Doncaster	Howorth, James.
Dorking	Clift, Joseph.
Douglas	Brearey, Arthur William.
Dover	Bottle, Alexander.
Dudley	Gare, Charles Hazard.
Dumfries	Allan, William.
Dundee	Hardie, James.
Dunfermline	Seath, Alexander.
Durham	Sarsfield, William.
Ealing	Curtis, F. G.
Eastbourne	Crook, Herbert.
East Grinstead	Tully, John.
Eccles	Howie, William Lamond.
Egremont (Cumberland)	Ireland, Edward J.
Elgin	Robertson, William.
Epping	Rowland, Thomas.
Evesham	Dingley, Richard Loxley.
Exeter	Broom, William W.
Eye	Bishop, Robert.
Falkirk	Murdoch, David.
Falmouth	Newman, Walter Francis.
Fareham	Batchelor, Charles.
Faversham	Lenfestey, William G.
Flint	Jones, Owen Williams.
Folkestone	Goodliffe, George.
Forfar	Ranken, John.
Gainsborough	Spouncer, Henry Thomas.
Galashiels	Walker, James.
Gateshead	
Glasgow	Kinninmont, Alexander.
Gloucester	Foulkes, William Henry.
Grantham	Whysall, William.
Gravesend	Clarke, R. Feaver.
Greenock	McNaught, Archibald.
Grimsby, Great	Cook, Robert, Junr.
Guernsey	Nickolls, John B.
Guildford	Martin, Edward W.
Haddington	Watt, James.
Halifax	Dyer, William.
Hanley	Cornwell, T. C.
Harrogate	Davis, R. Hayton.
Hartlepool	Jackson, William G.
Harwich	Bevan, Charles F.
Hastings and St. Leonards	Tharle, Charles A.
Hawick	Maben, Thomas.
Helensburgh	Harvie, George.
Henley-on-Thames	Batchelor, Charles J. H.
Hereford	Williams, Walter.
Hertford	Durrant, George R.
Hexham	Gibson, John Pattison.
Heywood	Beckett, William.
Hitchin	Ransom, William.
Honiton	Dyer, Edward H.
Horncastle	Kemp, Herbert W.
Houghton-le-Spring	Rowell, R. H.
Huddersfield	King, William.
Hull	Bell, Charles Bains.
Huntingdon	Provost, John Pullen.
Huntly	Chalmers, George.
Hyde	Wild, Joseph.
Hythe	Lemmon, Robert Alce.
Ilkley	Worfolk, G. W.
Inverness	Allan, Alexander.
Ipswich	Anness, Samuel Richard.
Jersey	Ereaut, John.
Keighley	
Kendal	Severs, Joseph.
Kettering	Thursfield, John F.
Kidderminster	
Kilmarnock	Borland, John.
King's Lynn	
Kingston-on-Thames	Walmsley, Samuel.
Kingswinford	
Kirkcaldy	Storrar, David.
Knutsford	Silvester, Henry T.

Towns eligible.	Names of persons appointed.
Lancaster	Vince, James.
Launceston	
Leamington	Pullin, W. H.
Leeds	Reynolds, Richard.
Leek	Johnson, William.
Leicester	Clark, Walter Beales.
Leigh (Lancs.)	Bennett, John W.
Leighton Buzzard	Readman, William.
Leith	Finlayson, Thomas.
Leominster	Sandiland, R. B.
Lewes	Saxby, Henry.
Lichfield	Perkins, John Jaquest.
Lincoln	Maltby, Joseph.
Liverpool	Parkinson, Richard.
Llandudno	Winter, Joseph.
Loughborough	Scrase, Richard.
Louth	Smith, Mark.
Lowestoft	Clarke, Geo. Ernest.
Ludlow	Woodhouse, George.
Luton	Duberley, George S.
Macclesfield	Bates, William Isaac.
Maidenhead	Walton, Ralph.
Maidstone	Stonham, W. B.
Maldon	Wallworth, David.
Malton	Buckle, James.
Malvern	Coldwell, David B.
Manchester, etc.	Benger, F. Baden.
Mansfield	Patterson, Douglas J.
March	Davies, Peter Hughes.
Margate	Candler, Joseph Thomas.
Market Harborough	Bragg, William B.
Melton Mowbray	Wing, Geo. N.
Merthyr Tydvil	Smyth, Walter.
Middlesborough	Buck, Thomas.
Montrose	Reid, John.
Morecambe	Birkett, John, Junr.
Morpeth	Schofield, F. E.
Newark	Cherrington, Geo. W.
Newbury	Davis, Henry J.
Newcastle-on-Tyne	Martin, Nicholas H.
Newcastle-under-Lyme	Poole, Weston.
Newmarket	Barrow, Frank Arthur.
Newport (Mon)	Paine, Charles.
Newport (Salop)	Barlow, John.
Newtown	Owen, Edward.
Northampton	Bingley, John.
Northwich	Humphreys, Griffith.
Norwich	Sutton, Francis.
Nottingham	Parker, William Henry.
Nuneaton	Iliffe, George.
Oldham	Bates, Henry.
Oswestry	Evans, John.
Otley	Lockwood, Thomas.
Over Darwen	Shorrock, Ralph.
Oxford	Prior, George Thomas.
Paisley	MacCowan, R. T.
Pembroke Dock	Laen, William.
Penrith	Kirkbride, W.
Penzance	Buckett, Alfred Henry.
Perth	Donald, David.
Peterborough	Heanley, Marshall.
Petersfield	Edgeler, William B.
Plymouth	Sloggett, Thos. C.
Pontefract	Bratley, William.
Pontypridd	Cule, Taliesin.
Poole	Pomeroy, Francis T.
Portsmouth, etc.	Childs, James L.
Preston	Willan, William.
Prestwich	Mercer, Allan.
Radcliffe	Pollitt, Joseph Moore.
Ramsey (Hunts)	Palmer, Frederick Wm.
Ramsgate	Baily, Edward.
Reading	Cardwell, Ernest.
Reigate	
Richmond (Yorks)	Walton, E. Bridges.
Ripon	Parkin, Joseph Brooks.
Rochdale	Taylor, Edward.
Rochester	Watts, George Wm.
Romford	Lasham, John William.
Ross	Matthews, Thomas.
Rotherham	Horsfield, John M.
Rothesay	Duncan, William.
Rugby	Brown, Frederic P.
Ruthin	Rouw, Theodore J.
Ryde (Isle of Wight)	Pollard, Henry Hindes.
Rye	Waters, William Allen.
St. Albans	Ekins, Arthur E.
St. Andrews	Govan, Alexander.
St. Austell	Binks, Burcham.
St. Ives (Cornwall)	Young, Tonkin.
Saffron Walden	Gilling, John.
Salisbury	Atkins, William Ralph.
Scarborough	Whitfield, John.
Sevenoaks	Pain, Edwin.
Sheffield	Ward, William.
Shields, South	Noble, John.
Shipley	Dunn, Henry.
Shrewsbury	Cross, William Gowen.
Skipton	Wilks, Robert.
Southampton	Dawson, Oliver R.
South Molton	Swingburn, Richd. Hy.
Southport	Ashton, William.
Spalding	Branston, John Williams.
Stafford	Averill, John.
Stalybridge	Simpson, Allwood.
Stamford	
Stirling	Shairp, William.
Stockport	Kay, Samuel.
Stockton-on-Tees	Brayshay, Thomas.
Stoke-on-Trent	Adams, Frank.
Stourbridge	Selleck, W. H.
Stowmarket	Gostling, George James.
Stratford-on-Avon	Hawkes, Richard.
Stroud	Coley, Samuel James.
Sudbury	
Sunderland	Harrison, John.
Swaffham	Bell, Frederick R.
Swansea	Gross, Nicholas M.
Tamworth	Allkins, Thomas Boulton.
Taunton	Short, George William.
Tavistock	Gill, William.
Teignmouth	Maunder, William.
Tenby	Davies, Moses Prosser.
Tewkesbury	
Thirsk	
Tiverton	Havill, Paul.
Torquay	Shapley, Charles.
Totnes	Morse, Charles H. S.
Truro	Percy, Thomas Bickle.
Tunbridge Wells	Howard, Richard.
Twickenham	Shelley, Henry.
Tynemouth	
Ventnor	Weston, Charles.
Wakefield	Duffin, Thomas.
Walsall	Elliott, George.
Warrington	Greenough, Hugh F.
Warwick	Pratt, Henry.
Watford	Chater, Edward Mitchell.
Wednesbury	Gittoes, Samuel James.
Wellington (Salop)	Bates, James.
Wellington (Somerset)	Windeatt, George Jas.
Wells (Somerset)	Manning, R. J.
Westbury	Paine, Charles.
West Bromwich	Eynon, C. J.
Weston-super-Mare	Hall, Edwin.
Weymouth	Groves, Thomas Bennett.
Whitby	Stevenson, John.
Whitehaven	Kitchin, Archibald.
Wick	Miller, Kenneth.
Widnes	

Towns eligible.	Names of persons appointed
Wigan	Phillips, Jonathan.
Wimbledon	Dowdeswell, Jonathan.
Winchester	Hunt, Richard.
Windsor	Russell, Charles J. L.
Wisbech	
Wokingham	Spencer, Thomas.
Wolverhampton	Gibson, Fredk.
Woodbridge	Betts, John.
Worcester	Virgo, Charles.
Worthing	Cortis, Arthur Brownhill.
Wrexham	Edisbury, J. F.
Wycombe	Furmston, Samuel C.
Yarmouth, Great	Poll, William S.
Yeovil	Maggs, Frederick R.
York	Sowray, Joseph.

Superintendents of Written Examinations.

It was resolved that the written examinations be held in the same centres as last year, and that the appointment of Superintendent be offered in the first instance to the local secretaries with the exception of London and Edinburgh.

The President stated that the Superintendent in Guernsey for some years past had been Mr. Collinette, who was a pharmacist there, but not a member of the Society; but there was now an examined member of the Society in the island, who, as a matter of course, became local secretary, and would in the ordinary course become Superintendent of the Examinations. He mentioned this in order to express the obligation of the Society to Mr. Collinette for having looked after the interests of the Society so long, and to explain how it was that he would no longer be Superintendent, as a member of the Society must, according to the regulations, be appointed to that position.

Mr. Evans drew attention to the fact that there was no centre between Carmarthen and Carnarvon, although Aberystwith was the seat of a university, and said that many Welsh students had to make a journey of 70 or 80 or 100 miles to be examined. He did not press the matter now, but hoped it would be borne in mind when arranging the centres next year.

Mr. Greenish said Aberystwith was formerly a local centre, but had been omitted a few years ago on account of the small number of candidates presenting themselves there.

The President said the subject should be borne in mind next year by the Committee when arranging the local centres.

Report of Examinations.

June, 1889.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.	
Major (19th)	8	7	1	
„ (20th)	9	6	3	
	—17	—13	—	4
Minor (19th)	20	5	15	
„ (20th)	21	3	18	
„ (21st)	25	14	11	
	—66	—22	—44	
	83	35	48	

Preliminary Examination.

Two certificates by approved examining bodies were received in lieu of the Society's examination.

Appointment of Professors for the Ensuing Year.

Professor Attfield was appointed Professor of Practical Chemistry.

Professor Dunstan was appointed Professor of Chemistry.

Professor Green was appointed Professor of Botany.

Mr. Holmes was appointed to conduct the demonstrations of materia medica.

Mr. Ince was appointed to conduct the lectures and demonstrations on pharmacy and practical pharmacy.

The Council Prizes.

Messrs. Blunt and Bowen were appointed to conduct the examinations for the Council prizes.

Preliminary Examinations.

The Secretary presented the following report as to the Preliminary Examinations:—

List of Centres and Table of Attendances of Candidates at each Centre.

	1886. Jan. Apr., July, Oct.	1887. Jan., Apr., July, Oct.	1888. Jan., Apr., July, Oct.	1889. Jan.,	1889. Apr.	Total number of attendances at each centre at 14 examinations.
ENGLAND AND WALES.						
Birmingham	64	66	65	10	18	223
Brighton	11	20	20	3	3	57
Bristol	55	36	37	9	8	145
Cambridge	15	9	18	11	5	58
Canterbury	9	16	10	1	6	42
Cardiff	41	25	16	6	9	97
Carlisle	24	39	54	8	10	135
Carmarthen	46	59	49	10	16	180
Carnarvon	29	22	26	5	7	89
Cheltenham	5	10	17	9	5	46
Darlington	22	24	26	8	4	84
Exeter	41	31	28	15	7	122
Hull	19	20	26	3	10	78
Lancaster	17	29	19	4	5	74
Leeds	55	61	69	20	19	224
Lincoln	35	34	28	5	5	107
Liverpool	50	68	52	18	17	205
London	169	148	176	26	59	578
Manchester	85	110	86	20	43	344
Newcastle	35	51	49	15	14	164
Northampton	16	13	13	2	3	47
Norwich	33	22	21	3	8	87
Nottingham	48	49	47	8	16	168
Oxford	7	15	12	3	2	39
Peterborough	18	22	13	4	5	62
Sheffield	26	29	42	7	13	117
Shrewsbury	21	20	24	2	6	73
Southampton	29	29	29	7	10	104
Truro	14	20	13	1	9	57
Worcester	7	11	9	1	3	31
York	25	32	27	2	13	99
SCOTLAND.						
Aberdeen	44	48	46	25	19	182
Dundee	35	25	37	6	12	115
Edinburgh	87	83	105	21	24	320
Glasgow	52	50	66	12	21	201
Inverness	7	17	10	2	1	37
Douglas, I. of Man	5	3	0	0	1	9
Guernsey	2	5	4	1	0	12
Jersey	2	2	4	2	1	11

The North British Branch.

A letter from Mr. J. R. Hill, Assistant Secretary, was read, giving the names of the members who had been elected to constitute the Executive of the North British Branch. (The names have been already published at p. 1040 of the Journal for June 29.)

BUILDING COMMITTEE.

This Committee reported that it had received seven tenders for the rebuilding of Nos. 15 and 16, Bloomsbury Square, but had decided not to accept either, but had requested the architect to go through the specification with a view to modifying some of the items.

At an adjourned meeting held on July 2, the architect had submitted a fresh tender from Messrs. Kirk and Randall, and gave details of the manner in which the cost of the building had been reduced. The Committee recommended that the tender of Messrs. Kirk and Randall for £7425 be accepted, and that the Committee be authorized to instruct the Society's Solicitors to prepare a contract, and get it executed. This estimate did not provide for rebuilding the party walls, should it be found necessary.

The PRESIDENT, in moving the adoption of the report, said the rough estimate given some time ago was considerably exceeded, but on going into the subject it was found that the architect had proposed certain forms of internal fittings which were very nice but somewhat costly and not really necessary, and consequently it had been possible to reduce the lowest tender sent in by nearly £2000, and still leave the Council room in the new building with very excellent and substantial fittings, whilst the other portion of the building would be of the ordinary character. The greater portion of the cost was in respect of the portion of the new building to be used for the purposes of the Society. Since the sketch plans were submitted on which the original estimate was based, it had been decided to cover rather more of the back space than was at first intended, and there had been no vaults in front of either of these two houses, which had since to be provided. Practically the original estimate, which was from £6500 to £6750 for the two houses, was only exceeded by about £600, which was attributable very largely to the causes he had indicated, and especially to what the architect called the "increased cube" of the portion to be used by the Society. The estimate still included a great many things which might very well be called fittings, such as a lift for the strong room, and certain other internal arrangements. The builders who had tendered were a large and highly respectable firm, and the Society would be quite safe in dealing with them on a scale of prices.

Mr. HAMPSON asked if any time had been named for the completion of the building.

The PRESIDENT said six months.

Mr. SCHACHT asked what was meant by the allusion to the rebuilding of the party wall.

The PRESIDENT said it was believed the two party walls were quite good, but until they were exposed it was impossible to say. Something might have to be spent more than was provided for, as if they were absolutely dangerous they would have to be rebuilt. No one could be quite sure about that, until the old building was pulled down, but there was every reason to believe that the walls were pretty good. The Duke of Bedford's agent had been changed since the negotiations commenced, and the plans had had to be somewhat modified to meet his views.

Mr. SCHACHT asked what portion of the whole would be expended on the house which was proposed to be let.

The PRESIDENT said about £3100 or £3200; that would not go so far back as the one to be used by the Society, which would go right up to the Examination Hall. The Duke's agent, when he saw the plans, complained that sufficient sanitary accommodation had not been provided, and an increase had to be made in that direction, which was rather expensive.

Mr. EVANS remarked that the original estimate was from £6000 to £7000, and when the tenders came in for more than £2000 above the highest figure it looked as if the architect was rather out of his calculations.

The PRESIDENT said he might have thought that the Society would be willing to have a superior building. The sketch plan on which the original estimate was based was not the same as that which had been decided upon. The architect was desirous of having the fittings of a more substantial character than were originally contemplated, and he also said—and this was confirmed by the builders—that prices were a little higher now than they were two years ago. He could put up a very good building on the site for £6500, but the object was to have it as well suited as possible for the requirements of the Society.

Mr. EVANS thought most probably other extras would probably crop up again as the building progressed, and would like to have some idea what the total amount would be, whether eight, nine, ten, or eleven thousand pounds.

The PRESIDENT said he did not think there was any reason to anticipate extra expense, except possibly with regard to the party wall.

Mr. MARTIN said he presumed the economy which had been effected in the internal fittings did not mean any inferior quality in the joists, doors, and so on.

The PRESIDENT said no; it was simply the question of an extra style of thing, as against a good useful style.

Mr. RICHARDSON asked the rental which would be expected from the private house, which he understood would cost over £3000.

The PRESIDENT replied from £150 to £200 a year.

Mr. ATKINS said of course there would be some expenditure necessary when the building was completed.

The PRESIDENT said of course there would be some furniture required and some gasfittings, but a certain portion of lighting was provided for, and it was probable they might have the electric light at a moderate cost.

Mr. EVANS said it would be just as well the Council should know the total cost, if the information could be given. Would it be likely to come to more than £8000 altogether?

The PRESIDENT said it would not be wise to make any precise statement. Mr. Evans himself might come and insist on more money being spent; but so far as he could see it need not cost more.

Mr. EVANS said last time the original intention was to spend between £6000 and £7000, and the Council finished by spending between £10,000 and £11,000. He should like to know whether it was going to do the same thing again, or whether it had something more definite this time.

The PRESIDENT thought there was something more definite on this occasion.

Mr. HAMPSON said this was a very important matter, but he had every confidence in the Committee, and was sure it would be as economical as possible.

The PRESIDENT said it was a pretty large Committee, and two of the members had as much knowledge of such subjects almost as if they were builders themselves. He was quite sure the Committee might be trusted not to spend money unnecessarily.

Mr. ATKINS said he had every confidence in the Committee, and should not think of casting any reflection on their work hereafter, but he might be allowed at this early stage to express the hope that the Committee would keep an eye particularly on the matter of extras. They all knew that on the former occasion the Council had been led into much more expense than was originally contemplated, and though he had not had much experience in building, from what little he had and what he heard he was quite satisfied that there were always extras which were found inevitable when once you began, though you had not anticipated them. If things were removed from the old building to the new one the old one would have to be rehabilitated, so that there would inevitably be some considerable outlay

beyond that provided for in the estimate. There was no disguising the fact that the Society was putting its capital into a form in which a large portion of it would be unremunerative and was adding to its establishment expenses while reducing its income.

The PRESIDENT said the Committee had had to modify the plans of the house on the other side to some extent, in order to meet the views of the adjoining tenant with regard to lights. The proposition submitted some ten months ago was to arrange for a building without a Council room, and it would be remembered that he was then outvoted, and told to recast the scheme and introduce a new Council room. He did not object to being considered a spendthrift, but when he wanted to be economical it was rather hard that he should be forced to go into more outlay and be taxed with it afterwards. He thought the Council wise at the time, but still this additional room added considerably to the cost of construction, and was not originally included.

Mr. ALLEN as a member of the Committee wished to say that the plans which had been finally adopted were not the same as those on which the estimate of £6500 to £6750 was based. It was quite correct that the Committee did endeavour some time ago to cut down the expenditure by a great deal. It was thought that a certain portion of the sanitary arrangements could be dispensed with; but when the plan was submitted to the Duke's agent, it was found that in a building like that, taking into consideration the purposes for which it was intended, it would be very much wiser to provide this additional accommodation, and that alone represented something like £250. Again there was no vaulting underneath the pavement at present, but permission had been obtained to excavate, and capacious vaults would be constructed there, which also would cost a considerable sum. After having received tenders for the larger amount, which the Committee was quite unable to accept, the architect had been desired to endeavour to cut down the expenses in some way or other, and at the meeting on the previous day he had given a full and detailed account of every item which he intended to touch. It was particularly put before him that the wish of the Committee was not to interfere with quality. The Council knew very well it could build a cheaper building, even on the same plans, but the wish of the Council would be to put up a substantial building which should be of good quality and likely to last. Therefore, no item the architect had modified would in any way interfere with quality. He could give the details, if necessary, and he had made a list of a large number of items, but he might say generally that the reduction was to a considerable extent effected in doing away with tiles, terra cotta, and oak fittings.

Mr. EVANS said he was quite sure the Building Committee had gone into the matter so carefully that it would welcome any criticism upon its labours, and he hoped any remarks he made would be accepted in that light. He fully believed the members of the Committee had done their very best, but he wanted to relieve them of one responsibility, if he could, by the questions he put, and what he wanted to know was what were the probable extras, and the probable cost of fittings, and the removal of fixtures from one place to another. Would the whole amount to £8000, £9000, £10,000 or £11,000, and was the whole scheme to exceed £20,000 from the commencement? He simply wanted the Building Committee to protect itself, so that no one might come forward in another year, and say you told us it would only cost £8000, and now it has cost £10,000 or £11,000. Of course no one could bind himself to a particular figure, but he thought the Council might have some idea given of what the thing was going to cost ultimately. He was not criticizing the Committee in any hostile spirit, but he might say that his own opinion was that it would have been much better if the other large section of the building which was now completed had been left until the present time, and the whole thing had been built together. It would probably have saved some thousands.

Mr. CROSS said he was sure the Council would be glad to hear the explanation which Mr. Allen had given, that the way in which the expense was cut down had been by lopping off luxury rather than necessity, and above all he was glad to hear the report that the Duke's agent had looked after the Committee as regards the sanitary arrangements. Those in the present building were a disgrace, and he did not think in a small provincial town such a state of things would be allowed.

Mr. HARRISON asked whether in the very large reduction which had taken place in the tender proposed to be accepted there had been any reduction in the accommodation required for business purposes; whether the new building met the Society's present and future requirements.

The PRESIDENT said certainly.

Mr. RICHARDSON said the luxury of having a new Council room had been referred to, but he understood that in a short time the present Council room would be required for the Library, and therefore the members ought not to be blamed for that.

The PRESIDENT said he had suggested that the Council should meet in the Examination Hall.

Mr. ROBBINS said one of the largest reductions was in tiles and terra cotta, which would look very smart, but the Duke's agent did not seem to care much about them, and some people thought the building would look all the better without them.

Mr. EVANS said all he wanted to know was the probable amount of extras.

Mr. RICHARDSON said no one could tell. When the house was built Mr. Evans might be the first to suggest that some extra expense should be incurred in fittings or ornaments.

The PRESIDENT said the Committee would have to come to the Council to sanction any further outlay, and it was unreasonable to ask him to say what the amount would be. He should decline to do so, especially after the free use which had been made of an observation made by an individual member of Council on a former occasion when he mentioned a particular figure. All he could say was that the Committee was a thoroughly representative one and contained two or three members who knew as much about the value of building materials as the architect, so that there was every security that no unnecessary expenditure would be incurred.

Mr. GOSTLING agreed in what the President had said. Though the estimate was now a little over £7,000 everyone's experience in building was that there were sure to be extras which could not be foreseen. Every care would be taken, and nothing would be done without the sanction of the Council, and that was all that could be said.

Mr. ABRAHAM asked if the new front would be uniform with that of their present buildings?

The PRESIDENT said No; the elevation would be red brick and Portland stone. The Committee objected very much to stucco and paint, which was very expensive to keep up, and some day, if the Society could afford it, it might be proposed to take off the stucco and make the old building correspond with the new one.

The motion was then put and carried unanimously.

A resolution was also passed authorizing the President to sign and seal the contract with Messrs. Kirk and Randall when prepared.

THE INTERNATIONAL PHARMACEUTICAL CONGRESS.

The PRESIDENT said a report had been received from the Committee of Organization of the Seventh International Pharmaceutical Congress, to the effect that the members of the Lombardian Pharmaceutical Society had formed themselves into a Committee, with Professor Cannizzaro as President, and Messrs. Arturo Castoldi and Venturini Vittorio, Secretaries; and they had issued a circular stating that after considering the advisability of holding an International Congress this year at Milan, they had decided, having regard to certain congresses which were to be held in Paris, and which might interfere with gentlemen coming to Milan, that the Congress should not take place until next year, when it would be held during the first fortnight in September. It was announced that each member in sending in his adhesion might at the same time remit 10 francs, which looked like business.

The VICE-PRESIDENT remarked that when the Congress was held in London, no charge was made to foreign visitors.

The PRESIDENT said it was usual with continental congresses. If there were no big exhibitions next year the congress would probably be a successful and an extremely pleasant meeting, and anyone who went would probably derive a good deal of mental gratification from his visit. Apart from the Italian pharmacists, Milan was now very convenient for Germans, since the St. Gothard tunnel had been opened, and not only for them, but for Russians, and those from the Mediterranean and further east would probably come in considerable numbers. Milan was in the centre of perhaps the most beautiful district in the world, close to some of the grandest lakes, and in full view of nearly the whole chain of the Alps.

Mr. RICHARDSON hoped arrangements would be made that the congress should not clash with the British Pharmaceutical Conference. There should, if possible, be a fortnight between.

Mr. ATKINS said the Congress had been postponed a little in order to avoid the extreme heat of the Italian summer season. Last year he spent ten days in the neighbourhood of Milan, called on Signor Zambelletti, and had a long talk with him about it. He hoped it would be a success, but if so it would not be through any great enthusiasm in Milan itself, where there were the same difficulties from want of union as existed in England. Signor Zambelletti was a foremost pharmacist in Milan, and took great interest in the Congress, but he told him there were many difficulties.

FREEHOLD GROUND RENTS COMMITTEE.

The PRESIDENT moved that a Committee consisting of the President, Vice-President, Treasurer and Mr. Hills be appointed to look out for suitable investments in freehold ground rents when occasion required.

The motion was seconded and carried.

MEDICAL ACTS AMENDMENT BILL.

The PRESIDENT said he had received a letter referring to an article in one of the trade journals on a Bill which had been introduced into Parliament by Sir Walter Foster. He had stated to his correspondent that the Bill was not correctly described in the article; it was simply a Bill which proposed to empower the medical corporations to grant certain titles in public health, sanitary science, and State medicine, which titles could now be conferred only by certain universities, and the other provision was to enable the Medical Council to place opposite the names of practitioners an indication of such diplomas having been granted them.* When the Medical Act passed there was no provision for the registration of titles in public health, sanitary science, and State medicine, and this was simply a Bill of two clauses providing as he had described. As his correspondent and others seemed a little alarmed about the matter, he thought it might be convenient to make this statement.

* The Bill is printed on p. 20 of the present number.

REPORTS OF COMMITTEES.

Mr. LEIGH said if he were in order he should like to suggest that the reports of the Committees be sent round to members of the Council with the agenda as soon as possible. This was done in many public bodies, and he thought it would facilitate discussion. He referred to the reports of such committees as the Library and Building Committees when they were held early in the month. This would assist members of the Council in getting a grasp of the work of the Society.

The PRESIDENT said the Report of the Library Committee was the only one which could be circulated, as the other Committees always met on the day before the Council. The report of the Library Committee was very long and full of detail. There was a good deal of work done, but it was formal routine work. Whenever there was any proposition brought forward which was special or abnormal, it was competent for any one to move that it be postponed for a month for consideration, and that was the plan usually adopted. He did not think any advantage would be gained from sending out these reports beforehand.

Mr. RICHARDSON said Mr. Leigh was probably alluding to Town Councils, where what he suggested was done, but that was only within the last few years.

The PRESIDENT said a member of the Council who was not a member of the Committee could hardly appreciate a written report without an explanation as to the reasons for coming to the decision.

Mr. SCHACHT remarked that the Committee had no reporter present, and he did not know who was to do the work. It would be merely a copy of the minutes, supposing any were made, which was not always the case.

Mr. EVANS said that difficulty could easily be got over; there were the same facilities to take notes in the Committees as in the Councils.

Mr. RICHARDSON said the Committees were appointed as a sort of executive of the Council. If they had not confidence in the Committees all the work would have to be done in the Council, which would lead to no end of chatter, and he was sure the business of the Society would not be conducted with the same facility. If the Committees did not possess the confidence of the Council they were of no use.

Mr. ATKINS said he did not understand that Mr. Leigh expressed any want of confidence in the Committees, but rather that he wanted when he came there to have a grasp of the work which had been done. He did not think the proposal was practicable. If Mr. Leigh wished to consult the minute book it would be perfectly within his power to do so before the sitting of the Council, and he might thus put himself thoroughly in touch with what had been done.

Mr. EVANS remarked that whenever a question of this sort arose someone always suggested that they must have confidence in the Committee. He was not backward in according his confidence, but at the same time the members of the Council were not to be muzzled, and he objected to such remarks being made.

GENERAL PURPOSES COMMITTEE.

This report included the usual letter from the Solicitor, stating the progress of the cases placed in his hands. In several cases which had been standing some time evidence had been obtained and proceedings were being commenced.

The Committee had considered other cases of alleged infringement of the Act which had been brought to its attention, and recommended that proceedings be taken.

The Council, as usual, went into committee to consider the report.

On resuming, the report and recommendations were unanimously adopted.

MEETING OF THE EXECUTIVE OF THE NORTH BRITISH BRANCH.

A meeting of the Executive of the North British Branch was held in the Society's House, 36, York Place, Edinburgh, on Wednesday, June 27, at 12.30 p.m. Present—Messrs. Boa, Gilmour, Mackenzie, Stephenson and Thompson, Edinburgh; Fisher, Dunfermline; Kerr, Dundee; Kinninmont, Glasgow; Maben, Hawick; Nesbit, Portobello; Paterson and Strachan, Aberdeen; Storrar, Kirkcaldy; and Watt, Haddington.

Apologies for absence were received from Messrs. Hardie, Dundee; Lawrence, Oban; and McAdam, Glasgow.

On the motion of Mr. Gilmour the chair was taken by Mr. Watt, Haddington.

The minutes of last meeting were read and approved.

The Chairman having intimated that the first business was the election of Chairman,

Mr. Stephenson said he had much pleasure in moving that Mr. Gilmour be elected Chairman. Mr. Gilmour had fulfilled the duties very efficiently, and as he had not yet been a full year in office he thought they had some claim upon him, and trusted he would accept for another year.

The motion was seconded by Mr. Mackenzie and unanimously agreed to.

Mr. Gilmour, having taken the chair, said he had to thank them for this renewed expression of their confidence. He would have much pleasure in devoting the best of his ability and as much of his time as possible to the affairs of the Society.

Mr. Watt, Haddington, said he had now held the office of Vice-Chairman of the North British Branch Executive from the beginning and had endeavoured to do what he could to further the interests of the Society. He thought, however, that the honours should go round, and he therefore proposed that Mr. Storrar, Kirkcaldy, be elected Vice-Chairman. Mr. Storrar had performed all his duties in connection with the affairs of the Society in an admirable manner.

The motion was seconded by Mr. Maben, Hawick, and unanimously agreed to.

Mr. Storrar said this was an unexpected and an undeserved honour, but as it seemed to be the desire of the Executive that this office should be filled by a country member he would accede to the desire, and do his utmost to perform all the duties efficiently. He regretted that Mr. Watt did not see his way to continue in the office, because he had done so much for the Society already, and was likely to do more. Though he did not agree with all Mr. Watt's views, either pharmaceutical or political, he had always admired the way in which he discharged all his duties.

The Chairman, Vice-Chairman and resident members were appointed a General Purposes Committee to take charge of any business arising between meetings.

The Assistant-Secretary submitted an estimate of the probable cost of the cleaning and painting required in the Society's House. This was remitted to the General Purposes Committee, with powers, as was also the making of arrangements for evening meetings during the winter months.

Mr. Paterson, Aberdeen, drew attention to the hour of meeting, which he said was too early for some country members. After some discussion, it was agreed that in future meetings of the Executive should be held at 1 p.m.

The Chairman said there was a matter of some importance which he understood had been troubling some of the members. He referred to the question as to the legality of their selling certain medicated wines. This was, he thought, a convenient opportunity for exchanging opinions on the subject. He might state that there had not been much difficulty in Edinburgh, but he was informed that in the north the Revenue authorities had been raising some difficulties.

Mr. Kinninmont, Glasgow, said that in Glasgow, Messrs. Frazer and Green and the Apothecaries' Company held a licence for the sale of such liquors as those mentioned by the Chairman. The former had four shops, but they only held the licence for one. They, however, could supply their customers in any part of Glasgow from the licensed premises. The latter gave an undertaking to the magistrates that they would not sell the liquors in question on Sundays. A gentleman in the Paisley Road had applied for a licence, but was refused. It had been suggested that the sale of certain specified wines by chemists only should be permitted, and that thus the difficulty would be obviated. He did not know whether that was practicable or not, but he for one strongly objected to the introduction of the American system of chemists selling liquor.

The Chairman: On what principle did the magistrates refuse the Paisley Road licence?

Mr. Kinninmont replied that they intimated they could only give a grocer's certificate.

Mr. Paterson, Aberdeen, said it was necessary to apply for a spirit licence as well, as the shop could not be opened on Sunday.

Mr. Kinninmont: And if they grant it to one they must grant it to all.

Mr. Boa asked whether the licences held by Frazer and Green and the Apothecaries Company were wholesale trade licences.

Mr. Paterson, Aberdeen, said he was aware that the licence of the Apothecaries Company was a retail one.

Mr. Storrar, Kirkcaldy, said he understood Messrs. Frazer and Green paid £12 12*s.* a year.

Mr. Kerr, Dundee, said he thought if anyone had a right to refuse it ought to be the Inland Revenue authorities. He himself held a wine licence, having had to take it out for Pearson's and Coleman's Wines. He had no trouble in getting the licence in Dundee, it being only necessary to have the application signed by two magistrates. The licence cost him £2 4*s.* 4½*d.*

Mr. Storrar, Kirkcaldy, said that was an ordinary grocer's licence, and asked how Mr. Kerr did with the officials if he sold after hours.

Mr. Kerr said nobody ever troubled him. He only sold medicated wines, but he was told he could sell all kinds.

Mr. Storrar, Kirkcaldy, said he could readily have obtained a licence, but did not take it, as he found he would be under the control of the magistrates in the conducting of his business. He could not then legally open on Sundays or even before 8 o'clock in the morning.

Mr. Paterson, Aberdeen, said if they took a £10 licence they could open on Sunday and sell at any time they liked. Under an excise licence they could legally sell any of the wines mentioned, and they would not be under police supervision in the same way as under the ordinary wine licence. Under the latter, with a judicious superintendent of police and Procurator-Fiscal they probably would not be interfered with. The magistrates, however, made no bargain with them, and if they took such a licence and opened on Sunday they were liable to prosecution and also if they sold after hours. Moreover, he suspected that if the superintendent of police had his attention drawn to the matter he would be bound to forward the case to the Fiscal for prosecution. Then, too, some one in the trade might use his power without any consideration for his neighbour, and action would at once be taken all over the country. That would be against the interests of the public, because there must be some means of obtaining necessary medicines on Sunday, and it would not do to have all the shops closed on that day. In the north they were having some trouble

about this matter, and as far as he could judge, the best plan would be to get certain of these wines added to the Pharmacopœia, and then they would be saved any further trouble regarding them. He thought they should approach the Chancellor of the Exchequer, either through the Society or by the united action of the chemists all over the country. There might be a licence for medicated wines similar to what there was for British wines, and then sellers would not be subject to police supervision. It should also be remembered that if they were to sell certain quantities of these wines under a grocer's certificate they would have no recourse against anyone disputing their account. They would either have to get cash, or put it out of the account altogether. He put the question to an official in Aberdeen, and he said that the Tippling Act might be brought into force, and an ingenious lawyer might chalk all these lines out of a Bill. Another restriction was that they would have to supply their customers out of standard measures. If they got the Chancellor of the Exchequer to pass such an Act as he had indicated, it should be left to the Inland Revenue authorities to issue regulations, as they did in other departments, defining what were medicated wines.

Mr. Watt, Haddington, said he had the greatest possible objection to have anything to do with a wine licence. He feared they would be classed with a number of people who were very desirous to push trade in that direction. He trusted he would never see chemists pushing the sale of these wines.

Mr. Paterson said he would like to explain that the licence he proposed would not be held from the magistrates, but from the Excise, in the same way as that for methylated spirit.

Mr. Watt said he did not know to what extent these wines were sold by provincial chemists, but he felt sure the sale would not pay with an expensive licence. As he had already said, he would not like to see chemists cultivating this trade more than was indipensable. He had observed some time ago in the Journal a suggestion which seemed to him the easiest way out of the difficulty for those chemists who objected to hold licences. The proposal was that each bottle of these wines should have on it a special charge or stamp for the licence. He further thought that if the matter were inquired into strictly it would be found that chemists could not hold grocer's licences and also sell methylated spirit.

Mr. Storrar, Kirkcaldy, said he had a letter from the Board, giving him permission to hold both a wine licence and a methylated spirit licence, provided either the one or the other was received, stored, and sold in sealed bottles. The medicated wines were so put up.

Mr. Paterson, Aberdeen, remarked that pepsine wine was not.

Mr. Watt, continuing, said he would not like to see chemists going forward for a licence. They should rather repudiate the idea as much as possible and keep to their own business. The sale of these wines had become a large trade, and was being pushed very extensively, but whether or not it would continue he did not know. He could not help stating his strong aversion to chemists holding a wine licence, which would cover the sale of all sorts of wine.

Mr. Thompson said these wines were ordered by doctors and chemists must supply them.

Mr. Mackenzie said the real question was whether it was worth their while meddling with licences. Surely the makers of these articles could easily make them to be taken with wine, and allow the consumer to supply his own wine. The less they had to do with licences the better.

Mr. Maben, Hawick, said if any one applied to him for any of these wines he would say he did not keep it, but if he were furnished with a doctor's prescription he would get a bottle for him.

Mr. Kinninmont, Glasgow, said that was illegal. They ought to send them to the grocer next door. Chemists had no more right to sell these wines than they had to sell port or claret.

Mr. Strachan, Aberdeen, said that on the previous evening he had a conversation with one of the Revenue Officers on this question. He asked the officer whether he could supply eight ounces of pepsine wine just as he could supply eight ounces of rectified spirits. The answer was "No." He then asked if he would be at liberty to supply it to a doctor's prescription. The officer declined to frame an answer to the question; he said his personal opinion was that he (Mr. Strachan) ought not to be prosecuted, but he would not guarantee that he would not.

Mr. Maben, Hawick, said he would run the risk of dispensing a doctor's prescription. It was ridiculous to think they could not do so. The onus would lie on the doctor and not on them. He agreed with Mr. Watt that it was a very risky business to try to get a new licence for themselves. As to having a special licence for medicated wines, he would ask what were medicated wines, and where would they draw the line? They would be unable to fix a standard when they could say this was a medicated wine and that was not.

Mr. Thompson said the difficulty must be got over some way or another. They must either take out grocers' licences or give up selling these wines.

Mr. Paterson mentioned in regard to one of the Glasgow cases that they had circulated a statement that the licensed branch was not opened on Sunday.

Mr. Kinninmont said the Buchanan Street shop was closed on Sunday, but the Apothecaries' Company's premises were open all day, but on the distinct understanding that these wines were not sold. Were this permission granted generally he believed it would practically turn drug shops into shebeens.

Mr. Storrar pointed out that doctors would prescribe Coleman's wine, and there ought to be a scheme whereby they could fulfil the doctor's prescription without objection. He objected to taking a grocer's licence, but what he asked was, Was there no other way of getting over the difficulty?

Mr. Mackenzie said chemists should approach the makers of those articles, and get them to put them up in a form that would allow of their being sold without a licence.

Mr. Storrar said the makers would reply that they could get the grocers to sell them.

Mr. Watt again said that he thought the best plan was to put a stamp on the bottles equivalent to the licence.

Mr. Boa said that would still be open to objection, and might bring the sale under the Tippling Act. The proposed stamp might very easily be abused. They might be selling a wine that was nominally medicinal, but not so in reality. Many of the so-called medicinal wines were really not medicinal at all, but were sold for another purpose. People might buy such wines merely for a tipple, and the chemist would practically be on a level with the publican. While recognising the convenience in certain cases of taking out a grocer's licence for the purpose of selling these wines, he did not think it was a principle that should be recommended to the trade generally. His own feeling was that the sale of many of those wines, and he would not mention names, should be discouraged, because practically they were not medicinal wines, and it was a misnomer to call them so. With regard to really medicinal wines he did not think there was much danger of prosecution. If they made their pepsine wine in a proper manner for use only as a medicinal agent, though they might have no legal right to sell it, he did not think they would be prosecuted. The sale of spirits, such as brandy, even for a medical

prescription, was quite illegal. If it were mixed it might be allowed.

Mr. Maben: But what if it is signed by a doctor?

Mr. Boa said the onus would be on the chemist and not on the doctor. If anyone came to him for one of these compound wines he told him he did not keep it, but recommended him to get a bottle of good port next door.

Mr. Nesbit, Portobello, said he quite concurred in the opinion that the less chemists had to do with these wines the better. If they took out a grocer's licence it would bring them down to the level of a publican.

Mr. Mackenzie said he thought they should utilize their organization as a society, and seek to obtain proper representation by having two members of the Pharmaceutical Society on the General Medical Council. In this way they might get the Medical Council to do something in the matter under discussion by adding these medicinal preparations to the Pharmacopœia.

The Chairman said the discussion had done good by showing those members who felt the shoe pinching that they must be prepared to take the consequences. If they took out a grocer's licence they saw what it involved. It seemed to be just out of the frying-pan into the fire. He did not think the discussion could be carried further that day.

Mr. Strachan said a meeting of the local Society had been held in Aberdeen on the previous night, and what Mr. Mackenzie had mentioned was practically what they resolved to do, namely, to send a request to the General Medical Council to insert formulæ in the Pharmacopœia for these medicated wines. He did not, of course, mean any of the proprietary medicated wines.

Mr. Paterson urged that the question should be put upon some clear legal basis, and he thought some representation to that effect might be made to the Council. It was unfortunate that they, as a body, should be selling pepsine wine, which he thought they were perfectly entitled to do, and be under the constant risk of being called to account for it.

Mr. Boa said they were not disturbed in Edinburgh.

Mr. Paterson said they were warned in Aberdeen, and prosecution had been threatened.

It was then resolved to adjourn further consideration of the subject till next meeting.

The meeting then closed.

Proceedings of Societies in London.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

The annual general meeting was held on Thursday, June 27, Professor Attfield, F.R.S., President, in the chair. The following report was read by the Secretary:—

Annual Report of Executive Committee.

The Executive Committee of the School of Pharmacy Students' Association have held three meetings for the transaction of the business of the session.

At a meeting held November 28, 1888, the Secretary reported that nomination papers had been printed at the commencement of the session, and forwarded to all members who had previously paid their annual subscriptions. At the same meeting the following members were appointed as a Committee of Reporters on the sciences allied to pharmacy: Pharmacology, Miss M. E. Buchanan; Practical Pharmacy, Mr. F. C. J. Bird; Botany, Mr. W. Wyatt; Materia Medica, Mr. W. A. Salter; Physics, Mr. E. J. Eastes; Organic Chemistry, Mr. A. C. Stark; Inorganic Chemistry, Mr. L. W. Hawkins; Analytical Chemistry, Mr. F. Browne.

At the same meeting, a motion was made by Mr. Sturton, that instead of all the meetings being devoted to reading papers, some should be of a social character. It was, however, pointed out by the Secretary that this would be contrary to the Rules of the Association, Rule IX. providing that "The ordinary meetings of the Association shall be devoted to the reading and discussion of papers and reports," and after some discussion, the subject dropped.

At a meeting held May 23, 1889, a grant of 7*s.* from the Research Fund was made to Mr. A. J. Simons to defray the expenses of his paper on Selenium, and a grant of 9*s.* to Mr. H. D. Fuge for the expenses of his paper on Cascara Sagrada.

At a meeting held June 27, the Secretary reported that the papers and reports of the previous session had been copied in type, bound, and presented to the Library of the Pharmaceutical Society, and that a letter of thanks from the Society had been received. An application from Mr. Latchmore for a grant of 14*s.* from the Research Fund, to defray expenses incurred in the illustration of his paper on Spectrum Analysis was considered and granted. The following statement of the Committee of Reporters was read by the Secretary on behalf of the Committee.

The Committee of Reporters on Science have, since their appointment in November, 1888, held two meetings for the transaction of business. At a meeting held December 6, 1888, the order of Reports for the ensuing session was arranged; the following reports have been made by the members of the Committee during the session:—"Report on Materia Medica," by Mr. W. A. Salter; "Report on Analytical Chemistry," by Mr. W. F. Browne; "Two Reports on Botany," by Mr. W. Wyatt; "Report on Organic Chemistry," by Mr. A. C. Stark; "Report on Pharmacology," by Miss M. E. Buchanan; "Report on Inorganic Chemistry," by Mr. L. W. Hawkins; "Report on Physics," by Mr. E. J. Eastes; "Report on Practical Pharmacy," by Mr. F. C. J. Bird.

This statement was approved by the Committee.

The following statistics show the progress of the Association durring the Session:—The number of members on the books is 66, being four less than last session; on the other hand the attendance at the meetings, which showed a marked increase last session, has still further improved. The number of meetings held has been thirteen, including to-night's annual meeting, and the gross attendance 290, making an average attendance of between 22 and 23 at each meeting. The number of communications read has been 27, viz., 9 reports already mentioned and 18 papers or notes, of which the following is a list:—"Introductory Address," by Professor W. R. Dunstan, M.A.; "Spirit of Sal Volatile, and its Estimation," by Mr. C. W. Andrew; "Sir Humphrey Davey," by Mr. C. B. Bell; "Tests for Pilocarpine," by Mr. L. Ough; "Euonymins," by Mr. W. T. Jones; "Mercurous Iodide," by Mr. W. Allen; "Alums," by Mr. J. B. Thornley; "Cascara Sagrada," by Mr. H. D. Fuge; "The Preparation of Aloin," by Mr. T. Woodruff; "Lactic Acid," by Mr. C. J. Wain; "Combustion in Moist and Dry Oxygen," by Mr. R. H. Bremridge; "Selenium and its Compounds," by Mr. A. J. Simons; "Beer and Brewing," by Mr. W. W. Crisp; "The Tees-side Iron Industry," by Mr. W. J. Talintyre; "Notes on Dispensing," by Mr. Albert Smith; "The Composition of a Counterfeit Half-crown," by Mr. C. W. Andrew; "Telephones," by Mr. G. S. Fuller; "Spectrum Analysis," by Mr. A. Latchmore.

Seven of these papers and four reports have been published by the Editor of the *Pharmaceutical Journal*, as well as abstracts of all the others.

The Treasurer's accounts, to be presently audited, show that the receipts have amounted to £8 17*s.* 0*d.*, and the working expenses to £8 17*s.* 4½*d.*; in addition,

grants have been made from the Research Fund, to the extent of £1 10*s.*, leaving a balance of £20 10*s.* 1½*d.* to the credit of that fund.

Messrs. Burridge and Marsden were then appointed to audit the Treasurer's accounts, which they reported to be correct.

The report was then, on the motion of the Chairman, seconded by Mr. W. T. Jones, adopted by the meeting.

The business concluded with votes of thanks to the President and other officers of the Association.

At the conclusion of the meeting, Mr. Fuge, on behalf of the students of the school, said they had very recently learnt that Mr. E. White was about to resign his post of Junior Demonstrator, and they desired to show their appreciation of his services. They had not yet had sufficient time to prepare an address and get the names of all who wished to participate in it, but as this would be their last opportunity of meeting Mr. White publicly, they would ask the Chairman to present him with a silver-mounted cane as a mark of their cordial esteem.

The cane was then presented by the President, who spoke of the pleasure it gave him to find that Mr. White's work in the laboratory was so well appreciated, and he felt sure Professor Green would think the same of his work with the Practical Botany classes.

The gift was suitably acknowledged by Mr. White, who was received with great enthusiasm.

The proceedings then terminated.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth botanical excursion of the season took place on Wednesday, June 26, to Blackford Hill. Twenty-four members met at the Blackford Hill Station at 9 p.m., and had a most delightful and profitable ramble round the western base of Blackford and down the banks of the Braid Burn, reaching town again about 11 p.m. A large number of interesting specimens were collected, including *Conium maculatum*, *Digitalis purpurea* and *Sambucus nigra*. Structural as well as systematic botany came in for a large share of attention, many students preparing for examination finding these rambles valuable opportunities for acquiring that practical knowledge of plant forms demanded of the pharmaceutical candidate. The next excursion takes place on Wednesday, July 10, to Craigcrook, by train from Caledonian Station at 5.50 a.m. and returning from Craigleith Station at 8.1 a.m.

Parliamentary and Law Proceedings.

A Bill to Amend the Medical Act, 1886.

The following is the text of the Bill referred to at the meeting of the Council (see before, p. 16):—

Be it enacted by the Queen's most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, as follows:—

1. *Short Title and Construction.*—This Act may be cited as the Medical Act, 1889, and shall be construed as one with the Medical Acts.

2. *Medical Corporations within the Meaning of the Medical Act, 1886, entitled to Grant Registrable Diplomas in Sanitary Science.*—Every body being a medical corporation within the meaning of the Medical Act, 1886, or any two or more of such bodies acting in combination, shall be competent to hold special examinations and to grant diplomas in sanitary science, public health, or State medicine; and every holder of any such diploma shall, subject to the provisions of section twenty-one of the said Act, be entitled to have such diploma entered in the Medical Register, in addition to any other diploma or diplomas in respect of which he is registered under the Medical Acts; and every such diploma shall be deemed to be a diploma in sanitary science, public health, or State medicine, under the said section within the meaning of section eighteen, subsection two, of the Local Government Act, 1888, for all other purposes.

Obituary.

Notice has been received of the death of the following:—

On the 22nd of May, Mr. John Flint, Chemist and Druggist, Ranelagh Place, Liverpool. Aged 70 years.

On the 27th of June, Mr. James Crispe, Pharmaceutical Chemist, Cheapside, London. Aged 68 years. Mr. Crispe became a member of the Pharmaceutical Society in 1859 and in 1864–5 he filled the office of Auditor.

On the 29th of June, Mr. Robert Brady Wade, Chemist and Druggist, Southdown Road, Shoreham. Aged 35 years.

We regret to have also to announce the death from brain fever of Mr. Henry Allen, B.Sc. Mr. Allen was a Bell Scholar in 1877, and in that session obtained a silver medal in each of the three departments of the School of Pharmacy, viz., chemistry, practical chemistry, botany and materia medica. In the following session he obtained the Society's Bronze Medal and held the position of Assistant Demonstrator in the Chemical Laboratories. During these years he was an active officer of the School of Pharmacy Students' Association, to which he contributed several valuable papers that have been printed in this Journal. In 1880 Mr. Allen became an assistant in the Patent Office, having been appointed on the results of an examination in mathematics, physics, and chemistry. Latterly he was promoted to an Assistant Examinership of Patents. In 1882 he proceeded to the degree of B.Sc. at the London University, which he took with considerable distinction.

ANSWERS TO CORRESPONDENTS.

Forcep.—We know of no perfectly safe anæsthetic that answers to all the conditions mentioned by you. A 10 per cent. solution of cocaine is now frequently injected into the gum before removal of a tooth, but it is desirable that three or four minutes should elapse after the injection, before application of the forceps, to allow for absorption of the cocaine.

Cymro and W. H. are referred to the rule as to anonymous communications.

E. Polack.—(1) The colouring matter could be obtained through almost any wholesale chemist. (2) For information respecting "universal gum" see the *Pharmaceutical Journal* for November 6 last, p. 361.

An Associate.—Your letter will certainly not admit of publication without the authentication of your name. We have therefore handed it to the Board of Examiners.

J. Morcombe.—(1) *Lycium barbarum.* (2) *Chiococca racemosa.* (3) *Arenaria serpyllifolia.* (4) *Sagina procumbens.* (5) *Alchemilla arvensis.* (6) No.

F. Gall.—*Sherardia arvensis* and *Asperula cynanchica.*

Communications, Letters, etc., have been received from Messrs. Wilkerson, Porteous, Hill, Burroughs, Wellcome and Co., Rentoul, Brunton, Barron, Harvey and Co., Thompson.

LESSONS FROM FIELDS AND LANES.

JULY.

"The flaunting flowers our gardens yield
High shelt'ring woods and wa's maun shield;
But thou beneath the random bield
O' clod or stane,
Adorns the histie stibble field,
Unseen, alane."

When Burns wrote these lines to the daisy he expressed in a few pretty words one of the most important characters of the order to which it belongs. The *Compositæ*, or at least the bulk of them, court the north wind, and are at home in soil which to many plants would mean utter starvation. They are more widely distributed than any other order of plants; they have acquired the "knack" of occupying crannies and corners inaccessible alike to plant and animal; their species and varieties are innumerable, and run so nearly into one another that the mere mention of the word *Compositæ* raises in the brain of the plant-hunter ghosts of a *pappus* which is neither pilose nor plumose, of ray florets which might or might not be hairy at the tip, of an involucre which might either be imbricate or one seriate, of fruits whose beaks might be long or short, or not there at all, of anthers whose tails might be there in their full glory or might have succumbed to social conditions, of styles which decline to be called either yellow or livid. During the whole year some of the members of the order are to be found in flower, but towards the end of June they begin to show what can be done by a unanimous effort, until in July the landscape owns them in many places as its most conspicuous feature.

The part of the dandelion or the daisy which is popularly known as the flower is not a flower at all, but an inflorescence; it is known as a *capitulum*, or head, and consists of a great number of sessile flowers crowded together on the flattened end of the common flower stalk. The stamens of these little flowers—or florets, as they are called—are joined together by their anthers, and form with the style a single column (*syngenesious*). The florets vary in shape, and this variation forms an important factor in the sub-division of the order. In the dandelion, which is typical of one division, they are all *ligulate*, or strap-shaped, that is, the corolla forms a flat band or strap-like body; if, however, this be traced to its base it will be seen that it ends in a little tube. The whole corolla was once tubular throughout, but has become modified in the direction of greater attractiveness. It will be noticed that the strap has five teeth at its apex; these are all that is left of five petals which once formed the corolla. The corolla of the dandelion then must originally have consisted of five separate petals, but as development proceeded these petals became united to form a *gamopetalous* tubular corolla. Some of these tubular corollas probably showed a tendency to flatten out so as to make themselves more conspicuous than their neighbours; the heads with the most showy flowers would be favoured with the greatest number of visits from insects, which are notoriously fond of things gaudy, and the consequence would be that the showiest heads would be the most thoroughly cross-fertilized, would therefore—as we have already seen—produce the most healthy offspring, and it would follow as a matter of course that these would stand the best chance of surviving—in the event of a struggle for life becoming necessary through scarcity of food, want of space, or other of the causes which are always at work weeding out the least fit. In the thistle and the hard-head or knap-weed, which represent a less developed division of the order, the florets are all tubular, while in the daisy we have an intermediate form, the central florets being tubular and the outer or ray florets being ligulate and of a different colour to those of the disc. The daisy is a well-marked example of what might very fitly be termed a natural law,—that development in the direction of extra showiness is almost always accompanied by a sacrifice of more essential organs, the showy ray florets of the daisy and its near relations, the "marguerites" or "moon-pennies," and the chamomiles, being possessed of a pistil only, and sometimes not of that. In the guelder-rose, a tree belonging to the same order as the elder, and now to be found in flower in copses, the same law shows itself in an equally marked degree; the outer florets of the inflorescence are much larger than the inner ones, but are quite innocent of either pistil or stamen.

Many of the composites, such as the dandelion and the goat's beard, are already in good condition for the examination of the fruit. The ovary is *inferior*, and is therefore to be looked for at the base of each of the florets, both corolla and calyx being on the top of it. The fruit, or fertilized and developed ovary and appendages, consists in the composites, of the ovary and a *persistent* calyx. The ovary is one-seeded, and the calyx in many members of the order, such as those just mentioned, is *pappose*—that is, the sepals have become reduced to hairs, which are sometimes rigid and sometimes soft and feather like, the form they take being an important means of distinguishing the genera. When the corolla has died off, the pappus develops considerably, spreads out, and with the help of the wind carries the seed and its embryo plant to pastures new. Who in his young days, when his imitative faculties were at their highest, has not tried to tell the "time o' day" by exercising his lungs on the pappus of the dandelion, or of the "cat's ear," a plant which has now taken the place of the dandelion in dry pastures, and is easily distinguished from it by its branched tough peduncle? The leaf-like bodies which surround the capitulum of composite plants and look like a calyx, are *bracts*, and form a good example of an *involucre* or ring of bracts.

In the light of what has just been said about the general structure of the *Compositæ*, it is comparatively easy to understand their wonderful adaptability to such varied conditions of climate and soil. Their wonderful "physique" they owe mainly to the almost universal practice of cross-fertilisation among them. The factors which bring this about are the conspicuous nature of the inflorescence, due to the collection of so many flowers in one mass and also in some cases to its brilliance and variety of colour; the absolute certainty of promiscuous pollen distribution among flowers so thickly set; and the easy accessibility of the honey to all kinds of insects, so encouraging a repetition of their visits. The honey is secreted at the base of the style and collects in the tube of the corolla; it is thus so easily sipped that the plant obtains insect allies of all varieties. The healthy influence

of cross-fertilization is intensified by the power possessed by the seeds of traversing large areas, so enabling them not only to reach fresh soil, but also to obtain foothold in places which are inaccessible to other plants, and where consequently the struggle for existence is less keen and the chance of survival infinitely greater. The high state of development of this order is wonderfully apparent in the contrivances some of its members have adopted for saving labour. While the calyx of each separate flower serves as a means of transport for its seed, there exists an involucre which, from the crowded position of the flowers, is enabled to act as a general protective calyx to the whole inflorescence, thus obviating the necessity for a protective calyx in the individual florets. The style serves not only as a channel by which pollen from another flower can reach the ovules at its base, but also as an instrument for distributing the pollen from the anthers of its own flower. But in order to understand this a little explanation is necessary. The flowers of composites are what is known as *dichogamous*, which means that the stamens and pistil reach maturity at different times; they are, moreover, *proterandrous*—that is the stamens ripen before the pistil—and the anthers generally discharge their pollen on the style before the flower opens. On the opening of the flower the style elongates, carrying with it—sometimes by means of hairs which form a brush on its outer surface—the pollen grains, which are then deposited on the first intruder; after this has been accomplished the style comes to maturity, splits in a forked manner at the apex, and exposes its sensitive stigmas, which are then in a position to make use of any pollen which comes their way from another flower. It will be at once seen that this contrivance, besides being of a labour-saving nature, renders self-fertilisation an impossibility, at least so far as the individual florets are concerned. Another direction in which the order has developed is exemplified by the thistles, which have found it necessary to protect themselves from the attacks of browsing animals and have, therefore, adopted a spiny covering.

The foxglove (*Digitalis purpurea*) is now at its best for examination, and from its important position in medicine should be of especial interest to pharmaceutical students. It is one of our noblest indigenous plants and is certainly July's most conspicuous floral ornament. The characters of its order (*Scrophulariaceæ*) have already been referred to and are nowhere better seen than in it. The corolla is generally described as *campanulate* and somewhat flattened, while the didynamous and epipetalous stamens are exceedingly well marked. The inflorescence is the best example obtainable of a *raceme*; in this the order of expansion of the flowers is *centripetal*, or *indefinite*, that is from the circumferences inwards, or, which is the same thing, from the bottom upwards. The foxglove can always be found with a number of fruits at the base and buds at the apex of the stem. It will be noticed that the flowers are all *stalked* and arranged at different heights on a *rachis*. This is always the case in the raceme, and serves to distinguish it from the *spike* and the *corymb*, in both of which the order of expansion is indefinite, but the former has the flowers sessile and at different heights, while the latter has them at different heights but with stalks of different lengths, the lengths being so arranged that the flowers form an almost flat topped inflorescence.

Another plant of pharmaceutical note now to be found in flower in moist places is the valerian (*Valeriana officinalis*). It varies in height from 1½ to 4 feet; the leaves are *pinnate*, and the leaflets generally *serrate*, the flowers are pink or lilac, and sometimes even white; the corolla is a well-marked example of the *saccate* or *gibbous* form, so called from the little sac into which its base is expanded; in this sac or pouch is secreted the honey, and the insects which would sip of it must first run the gauntlet of the pollen-discharging anthers, and the pollen-seeking stigma. As in the *Compositæ*, the valerian is *proterandrous*, and this is only one of the points in which the two orders resemble one another. The calyx is pappose, but must be looked for when the fruit has reached a late stage of development. It will be noticed also that the flowers are crowded together, although not so much so as in the capitulum, but that the central ones are the first to expand; this is characteristic of the *cyme*, the type of *definite* or *centrifugal* inflorescence; in everything but the order of expansion of the flowers the cyme of valerian resembles a corymb, it is therefore generally described as a *corymbose cyme*. The odour of valerian when growing is far from suggestive of the pharmaceutical drawer labelled "*Rad. Valer.*" If, however, the root be dug up and dried, it becomes at once apparent, even to the first year's apprentice, who has neither lived in the country nor studied systematic botany, that he has got the right thing.

Even at the risk of exceeding our limits of space we cannot leave the lessons of July without some reference to that most interesting of all our British orders, the *Orchidaceæ*. So long as a century ago the remarkable structure of the flowers of this order formed the subject of a treatise by Sprengel. He was succeeded in his investigations by Hooker and Robert Brown; but it was reserved for Darwin to take up all the loose threads at the points where they had been left incomplete by these observers, and by means of his masterly observations to weave them into a fabric of scientific fact than which there is none more beautiful, nor at the same time more difficult to rend. The important bearing of the subject on biology in general and the remarkable nature-interpreting faculty of the worker are brought into greater relief by the remembrance that Darwin's treatise on the subject, extending to nearly four hundred pages, was written amid the storm of abuse, criticism and misunderstanding following the publication of the 'Origin of Species,' which had appeared three years before.

The orchids which are indigenous to tropical countries, and which in England are only to be met with in hot-houses, are so bold in their habit and structure and so brilliant and varied in their colouring that in the popular mind, which is more familiar with nature in a hot-house than with nature at home, these qualities are generally associated with the whole order. So much is this the case that the exhibition of one of our indigenous species often gives rise to a look of disappointment, sometimes of doubt. British orchids, generally speaking, are delicate and retiring in their habits and, when compared with their tropical relatives, not by any means striking in their colouring, although under very favourable conditions they do some-

times show a tendency in this direction. They are, however, no less perfect in their adaptation for fertilization by insects. Perhaps the most showy member of the order is the butterfly orchid (*Habenaria bifolia*), which may be met with now in moist situations. In the neighbourhood of Bridge-of-Allan, N.B., we have met with this in great profusion, forming, indeed, the most conspicuous feature in the vegetation of both sides of the road for miles, and looking "so like an orchid," that it would have been sure to be taken for such by anyone who had been reading popular literature on the subject, and who would accordingly have a tendency to place in this order any plant which looked striking or beautiful. Perhaps the most likely members of the order to be met with, however, and also the most suitable for examination at present are the spotted orchis (*O. maculata*) and the marsh orchis (*O. latifolia*). The former is to be met with in woods and the latter in bogs; they are scarcely distinguishable from one another, and differ only in some unimportant particulars. They vary in colour from deep to pale purple, the flowers are in spikes; the leaves radical, lanceolate, generally spotted, and parallel veined (characteristic of *monocotyledons*). The roots are tuberculated, and the tubercules which compose them are divided in a *palmate* manner. The envelope of the flower is called a perianth, because it consists of a whorl representing the petals, and one representing the petals but indistinguishable from one another. The lower petal is large and hangs down like a *lip*, and is hence called the *labellum*. If this is traced backwards it will be found to end in a long *spur*. The ovary is *inferior* and twisted, and appears to form a stalk to the flower. If the ovary be traced forward into the mouth of the flower, it will be found to end in the stigma, which is sessile, broad, and sticky. Rising from the upper side of the stigma are two little elongated sacs, which are the anther lobes, and form with the stigma a single column; the flower is therefore said to be *gynandrous*, that is, having stamen and pistil forming one mass. Each of the anther lobes contains a mass of pollen glued together to form a club-shaped mass and provided with a stalk. The lower ends of the stalks are provided with a sticky disc, and curve towards one another just above the stigma, being concealed by a little process called the *rostellum*. The moment an insect's proboscis or head touches the rostellum, it becomes depressed, the insect comes in contact with the sticky discs attached to the *pollinia*, and in the act of pulling its head back pulls the pollinia out of their pouches; the cement on the discs sets hard and the insect flies away with two horn-like bodies attached to its head. If these remained in their original position it will be seen that if the insect visited another flower of similar structure they would not get near the stigma, but would touch the pollen pouches only, and therefore fail in their purpose. Nature, however, never does things by halves. As soon as the pollen masses are removed from their pouches the stalks—or *caudicles*, as they are called—begin to bend over, until they assume a position at right angles to their original one; thirty seconds it takes to complete the process, and by this time the insect has generally reached another flower, and the pollinia are placed on the centre of the stigma, whose sticky surface relieves the unconscious insect of its precious burden. The whole mechanism may be studied in either of the orchids mentioned by substituting for the insect's head the point of a pencil, and the veriest novice who watches the process and understands its purpose cannot fail to be impressed with the wonderful adaptive power of nature, and the high state of perfection to which she has brought some of her favourites.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 3.)

As previously stated, by far the greater number and the more important of the exhibits in connection with chemistry and pharmacy in the Paris Exhibition are to be found in the French court on the east side of the principal building. The actual area of this court is given as 1667 metres, of which about 700 metres are covered by the cases. The general appearance of these cases marks a most important difference in the control exercised over French exhibitors as compared with that which obtains generally in exhibitions in this country. Instead of allowing each individual an excessive latitude as to the design and ornamentation of the case in which he exhibits his goods, the cases in this court are all constructed on a harmonious plan, being, with one or two exceptions, either tall glass cabinets continuous along the walls, or isolated quadrangular blocks of uniform size, all painted black and moderately set off with gold.

When attention is turned to the contents of the cases it soon becomes apparent that strictly pharmaceutical exhibits are far from being relatively numerous, and do not form so prominent a feature as they did even in the corresponding part of the exhibition of 1878. This may partly explain the fact, which is made the subject of editorial complaint in *L'Union Pharmaceutique*, that the French Jury of Awards for the class of Chemical and Pharmaceutical Products, though it includes professors and manufacturers, has not a single practical pharmacist among its members. Now, as then, probably among the first things that will catch the pharmacist's eye, in consequence of their beauty of colour and generally fine appearance, will be the dry extracts prepared *in vacuo*, which by a little atmospheric manipulation towards the close of the operation are made to assume an elegant frothed appearance. Whether any further real advantage results from this treatment is perhaps somewhat problematical, nor does the frequency of their appearance as exhibits suggest that they are making any particular progress in pharmaceutical favour. Such preparations are to be seen in the case of Adrian and Co. (Société française de produits pharmaceutiques), of Paris, and in that of A. Grandval, of Reims, who shows, among others, alcoholic extracts of nux vomica and coca, and aqueous extracts of rhubarb, rhatany, red cinchona and roses, the last mentioned especially being of very fine colour. In addition to frothed dry extracts, Duboé-Dausse and Boulanger, of Paris, exhibit a series of very good-looking soft extracts, the fine colours of which are made manifest by placing thin layers between glasses comparable to lantern slides and suspending them in suitable lights. By this means the extract of Indian

hemp is shown to be of a rich olive green colour, while the beautiful red of the extract of Provence roses is equally well brought out. Saccharated pharmaceutical extracts and various alcoholates and concentrated tinctures are also shown by C. Mouysset, of Asnières. Extract of malt is shown in the French court by E. Déjardin, of Paris, who with somewhat unusual frankness gives to his preparation the alternative name "bière diastasée." This exhibitor also exhibits several allied preparations in which malt extract or "wine" is combined with various medicinal substances, as, for instance, coca. In the British court the makers of the well-advertised "Kepler" extract of malt are represented. Mention may be made here also of the preparations of pepsin and pancreatin and of the peptones produced by their action upon various alimentary substances. One of the most interesting exhibits of these is to be found in the case of J. J. T. Defresne, of Paris, which renders more regrettable a report that this exhibitor has, by a breach of etiquette in the offer of a bribe, deprived himself of any possibility of official recognition. This display includes peptone produced by the action of pancreatin upon meat, peptonized milk, cod liver oil emulsified by pancreatin, pepsin said to be able to convert 150 parts of fibrin, and diastase saccharifying 500 parts of starch and dissolving 2000 parts, claims which, by the way, are fairly moderate when compared with some that are put forward now-a-days on behalf of such substances. The activity of the pancreatin is practically demonstrated by the exhibition of a skeleton suspended in liquid in a bottle, as representing the undigested remains of a fowl that originally weighed eight kilograms. More interesting, perhaps, from a scientific point of view are the shining transparent scales of "steapsine," and the bright lemon-coloured scales of "amylopsine," which according to Defresne are the active constituents of pancreatin, the former being capable of breaking up twenty-four times its weight of fat, but not affecting starch, whilst the latter can saccharify twenty-five times its weight of starch, but does not attack fat. Other allied exhibits will be found in the cases of Chassaign and Co., of Paris, who show a series of "graded" pepsines; in that of P. Boeuf, of Paris, who displays pepsin in paste, powder, scales, granules and liquid, and in wine and pastilles, as well as some dry and syrupy peptones; and in that of J. A. Chassevant, who also shows pepsine pastilles. In the Belgian court A. Denaeyer and Co., of Brussels, exhibited his "liquid peptonate of iron," and similar preparations.

Another class of preparations that will force themselves upon the attention of the pharmaceutical visitor consists of the dragées, pilules, granules and perles that have taken so much more prominent a place in medicine during recent years. Concerning the exhibits little more can be said than that if efficacy depended only upon elegant appearance these preparations would be as nearly perfection as possible. In fact, it is in the presence of this marvellous perfection of external manipulation, lying far beyond the possibilities of most individual pharmacists, that the suspicion gathers force whether in some quarters the time has not come when in the words of a French contemporary "le pharmacien ne fait plus qu'acheter les médicaments." All well-wishers to the art of pharmacy, and in fact to the science of medicine, will, however, join in the hope expressed that there will always remain a certain number of pharmacists with a proper respect for their art, who will deem it a point of honour to make all their preparations with materials purchased by themselves and tested or analysed in their laboratories, since this is the only way by which they can place themselves in a position to guarantee the purity and quality of the medicines sent out from their establishments. With this reservation only words of praise can be used in respect to the general appearance of the exhibits of A. Le Couppey (Société de perfectionnement), of Paris, which includes dragées of ergotin and granules of santonin in the shape of comfits; of the perles, capsules, pastilles and pilules of Rigaud and Chapoteaut, of Paris, Duperron fils, of Flers, and of Vée and Co., of Paris, as well as of the "confiserie pharmaceutique" of Roudel frères and Genestout, of Bordeaux. Lastly, Homolle and Blaquart, of St. Denis, exhibit granules of Homolle's digitalin side by side with preparations of their "fer Quevenne." Closely associated with these are the capsule preparations, also of French origin, which are well represented in the case of Capgrand-Mothes, of Paris, and C. Thévenot, of Dijon. One of the substances exhibited, thus inclosed in capsules, by A. Lamouroux, of Paris, is the apiol of Joret and Homolle. It may be remarked that this exhibit is just one of those that might be made very much more interesting by a little added information. In this case, beside the capsules, are tall glasses containing liquids labelled respectively "apiol," "light oil of parsley," and "heavy oil of parsley," as well as a white crystalline substance. Now the substance to which the name "apiol" was first applied by Joret and Homolle was a yellow, oily, non-volatile liquid, denser than water, and having a peculiar taste and smell, obtained by exhausting parsley seeds with alcohol (sp. gr. 0·890), treating the tincture with animal charcoal and driving off the spirit (*Pharm. Journ.*, [2], iv., 270). It was this heavy oily liquid that was put forward originally in 1855 as a febrifuge, and which has attained a certain amount of reputation as an emmenagogue. But in 1880 H. C. Whitney asserted that the emmenagogue properties of parsley seed are chiefly, if not entirely resident in the volatile oil of parsley, which occurs in the seeds to the extent of upwards of 4 per cent. and forms a constituent of Joret and Homolle's "apiol." Meanwhile, as if to add to the confusion Gerichten reported that he had obtained from parsley seeds a camphor, to which alone he claimed the name "apiol" must be appropriated. It seems probable that in the articles mentioned as being shown in this case all these substances are represented, but the spectator is unaided in their identification and uninformed as to how far the statements that have been made concerning apiol are accepted or denied by the exhibitor. It may be mentioned that it has been stated that the disagreeable taste of apiol is satisfactorily covered by oil of peppermint. Another now familiar method of administering nauseous powders is shown in the unfermented paste wafers of Limousin and Co., of Paris. Close by these may be seen minute "ampoules" of glass, adapted for holding the liquids used in hypodermic processes of Pasteur.

Ointment bases are represented in very few cases. Lancelot frères, of Paris, exhibit several preparations made with "pétréoline," and the fine green colour of the "pommade épispastique au garou" and the red of the "pétréoline-cerat à la rose" well illustrate the advantages presented by pétréoline and similar hydrocarbons in this direction. Pétréoline, which is described as having somewhat superior consistence to vaseline, over which it is also claimed to present some advantages for the purposes of the pharmacist, is said to melt at 35° C., boil at about 300° and distil without residue, but at the same time to decompose, the products giving off the odour of petroleum. It is admitted also that prolonged exposure to the rays of the sun develops a slight odour of petroleum. At 50° C. it has a density of about 0·840. Pétréoline is said to be also employed by manufacturing perfumers in preference to fatty substances, and there is evidence in more than one part of the exhibition that the mineral hydrocarbons are being now employed as a pommade material. The method of use is said to be the same as with fats and oils, sometimes maceration in a water-bath at 40° C., and sometimes by cold enfleurage. The mineral hydrocarbon is said to possess a greater affinity for odours than either solid fats or oils, whilst it is itself inodorous and incapable of rancidity. Another point is that in recovering the odorous constituent from a fatty mother pommade by extraction with alcohol some of the fat always dissolves together with the essential oil in the alcohol and has to be removed; pétréoline, on the contrary, being insoluble in cold alcohol, does not involve that inconvenience in its use. One interesting statement made with regard to the action of pétréoline upon resin is that whilst this substance will take up the odour and the colourless portion of an aromatic resin, as, for instance, Siam benzoin, it will reject the coloured or oxidized constituents which impart to an alcoholic tincture a resinous and acrid taste. By subsequent liquefaction of the benzoin pommade in alcohol, and shaking, and decantation of the liquor after the mixture has cooled, a very aromatic colourless tincture is obtained that when sweetened is said to constitute a delicious table liqueur. Similarly the resino-acrid principle can be removed from Norwegian tar, which, however, remains coloured, but the pommade yields very aromatic concentrated alcoholic solutions of tar. The only other noticeable exhibit of unguentous material is by Burroughs, Wellcome and Co., of London, who show lanolin and preparations in their case in the British Court. Among other outward applications mention may be made of displays of spread plasters in the case of E. J. Grorichard, of Besançon, and H. Jouisse, of Orleans. But the greater number of preparations of this kind take the form of specialties, to which vesicating and allied applications, from thapsa resin to Rigollot's mustard leaves, supply a large contingent. "Inalterable linseed meal," exhibited in packets, by Boggio and Aulagne, of St. Etienne, is presumably simply ground linseed from which the natural fixed oil has been removed, to be replaced by olive or some other oil when the meal is required for poultice-making. Antiseptic and surgical dressings in general are fairly well represented. Antiseptic gauze and ointment, lint, iodized lint, and lint saturated with 10 or 20 per cent. of iodoform, are shown by A. Beslier, of Paris, and in addition to similar articles C. J. Desnoix, of Paris, shows antiseptic catgut. Le Beuf, of Bayonne, shows certain "emulsions médicamenteuses cicatrisants," said to be adopted in the Paris hospitals, the preparations consisting apparently of tolu balsam, oil of cade, coal-tar and similar substances emulsified by means of saponin. Bougies, suppositories and similar articles are shown by Reynal, of Paris, as well as the pencils, or "porte-rémèdes," associated with his name.

It only now remains to mention, before leaving this section of the subject, that several cases in the French as well as in the foreign courts are devoted to specialties more or less approximating to quackery, pure and simple. Some of the specialties, however, are particular preparations of known medicines. As instances of the latter may be mentioned the case of A. Langlebert, of Paris, where will be found preparations of *Convallaria majalis*, with which his name is associated in pharmaceutical literature, and of *Plantago psyllium*, which is claimed to be useful in affections of the alimentary canal, and, indeed, according to Dymock, the seeds of the plant have a special reputation in India as a remedy in dysentery. This case is made additionally attractive to the general visitors by the bed of it being covered by a mass of a very good imitation of lily of the valley.

In the next notice it is proposed to refer especially to the pharmaceutical and fine chemicals that are to be seen in the exhibition.

(*To be continued.*)

THE SPONGE FISHERY AND TRADE OF THE UNITED STATES.*

BY RICHARD RATHBUN.

(*a*) *The Commercial Importance of Sponges.*—The sponge trade of the United States is very extensive, and supplies are obtained from all the principal sponge-producing regions of the world, not the least important of which is the coast of Florida.

All of the various grades of commercial sponges belong to a single genus, called Spongia, and, according to an eminent authority on the subject, may be divided into four natural species, including at least nine sub-species and a great number of varieties. One of these species, the Spongia graminea, an inferior grade of the grass sponges, is peculiar to Florida, but the other three species are common to both the Old World and the American grounds. They are as follows: Spongia officinalis, including the Levant toilet sponge and the Turkey cup sponge of the east, and the glove sponge of Florida and the Bahamas; Spongia equina, containing the horse sponge, the Venetian bath sponge and the Gherbis sponge of the Mediterranean, and the noted sheepswool sponge, the velvet sponge, and a portion of the grass sponges of American waters; Spongia aqaricina, including the Mediterranean Zimocca sponge, and the American yellow sponge and "hard head."

The several varieties of sponges, based upon differences in structure, and the numerous qualities, resulting in part from the diverse influences of environment during growth, have given rise to the many commercial grades according to which sponges are classified and sold in the markets. The Florida grades, strangely enough, have never been increased

* From the Report of the United States Fish Commission. Reprinted from the *Oil, Paint and Drug Reporter*, June 5.

in number above the six sub-species recognized by naturalists as belonging to that region, and they are designated under five names—the same term, grass sponge, having been applied to two of the sub-species. These grades, arranged about in the order of their value, are as follows: Sheepswool, velvet, yellow, grass and glove. The sheepswool sponges are by far the the finest in texture of any of the American grades, but the relative qualities of the other grades are not always clearly defined; at least the dealers differ greatly in their opinions regarding them, and the market quotations do not always place them in the same order. The Bahama sponges, although identical subspecifically with the Florida, and including the same five principal grades, are still further subdivided, making a total of about fifteen grades recognized by the New York dealers. The secondary divisions are based mainly on differences in shape and on the comparative openness of the texture. The Mediterranean grades number as many as twenty-five, in the classification of some of the New York importers, but not a few of these must be founded on differences of slight importance.

The finest grades of sponges are the so-called Turkey sponges of the Mediterranean, the wholesale prices of which range from about $5 to $50 dollars per pound. Next in quality are the sheepswool sponges of Florida and the Bahamas, bringing from $1·50 to $2·25 per pound. Notwithstanding this great difference in price between the Turkish and the sheepswool sponges it is not now generally considered that the latter is so inferior in quality to the former as their respective market values would appear to indicate, and for many of the nicer purposes for which sponges are used, the Florida sheepswool grade is often preferred. The sheepswool sponges are not quite so fine and close in texture, but they are equally elastic and far more durable, and when properly prepared, greatly outlast the Turkish sponges. The fact that the latter are more carefully bleached, and therefore generally present a cleaner appearance, and also that they are an imported article adds greatly to their value in the opinion of most persons. The American trade in foreign sponges is very extensive, all of the New York sponge houses engaging in it, while two or more deal in no other kinds.

The Florida sheepswool sponges are now regarded more favourably in the New York market than the Bahama sponges of the same name, the difference in quality being due, it is said, partly to the character and mode of growth, and partly to the method of preparation. Although belonging to the same species, the texture of the former is naturally somewhat the finer, and the masses grow in better and more compact shapes. An examination of a large assortment of Bahama sheepswool sponges as received from the producers will show that a considerable percentage are pierced from below by large and irregular cavities, which sometimes penetrate nearly to the top. These are said to be mainly produced by the irregular character of the bottom on which they grow, but they probably also arise from a natural tendency to form a more open structure than the Florida sponges.

This grading of sponges according to compactness or solidity of structure is also recognized in classifying the Turkish and other Mediterranean varieties. For instance, the Turkish sponges are first graded according to their texture, into fine, coarse, etc. Then the finer and other grades are again sorted with reference to shape and solidity, the rounder and more compact forms being regarded as the best, while those of a flattened or very irregular shape, or with very many holes, are considered as inferior. So great is the difference between these several divisions of each grade, as determined by shape and solidity, that while the best shapes and structures of the finest textured Turkish sponges sell sometimes at as high a price as $50 a pound, the inferior shapes and loose structures of the same textures bring but a few dollars a pound. Shape and solidity as well as texture, must, therefore, be considered in grading sponges of all varieties, and many of the numerous grades of foreign sponges are formed in this manner.

Marketable sponges range in weight from about 1 ounce to 1 pound, but the smaller sizes within these limits are most in demand. The supply of good grade sponges, of both the Florida and foreign varieties, is unequal to the demand, and very many more could be sold annually than the fishing grounds have yet been made to yield. One dealer informs us that the demand upon him for the better qualities of Florida sponges is ten times greater than he can supply. There are, therefore, no indications at present of an overstocked market, but the question naturally arises as to whether there is not great danger of the fishing grounds becoming exhausted from the continuous drains being made upon them. Certain sections of the Florida coast, which have been most diligently fished over, have become more or less depleted, but new and extensive grounds are being constantly discovered, and the yield has not varied greatly from year to year. Still, there is strong foundation in fact for the belief expressed by many, that the present indiscriminate fishing will sooner or later result unfavourably for the Florida coast at least, and several of the New York buyers have expressed a desire for immediate legislation prohibiting the taking of the better qualities of sponges under a certain size, that size to be equivalent to a weight of about 1½ ounces. In this manner the younger growths would be protected, and the future supplies of large specimens would be more or less insured. This subject is one which merits prompt attention, and it derives an additional interest from the recent successful attempt at artificial sponge culture about Key West.

Sponges have hitherto been bought and sold in large quantities entirely by weight, but some of the New York dealers advocate their sale by count, in order to circumvent certain fraudulent practices which are now largely indulged in, such as sanding and liming, and also because of their well known absorptive qualities causing them to weigh much more in moist climates than in dry. This new method of buying and selling has already been started to a slight extent.

At the fishing ports, of which Key West is the principal one in Florida, the sponges brought in by the vessels are, after drying, graded by the agent, each grade being packed separately in bales or cases, and are then ready for shipment to market. New York is the only distributing centre for Florida sponges, and receives nearly all the foreign sponges imported into this country.

(*To be continued.*)

THE CONVERSION OF OLEIC INTO STEARIC ACID.

BY P. DE WILDE AND A. REYCHLER.

By heating oleic acid with 1 per cent. of iodine in sealed tubes to 270°–280° a mixture of fatty bodies results, containing 70 per cent. of stearic acid. This fatty acid can be separated by melting the contents of the tubes with tallow soap, boiling with acidulated water, and then distilling with superheated steam. One-third of the iodine is obtained as hydriodic acid in the resulting liquors, but the remainder is difficult to recover, being retained in the tarry residue formed. Bromine acts similarly, yielding a solid acid melting at 51·5°, whilst with chlorine an acid melting at 31·5° results. The addition of colophony facilitates the reaction in each case. It is suggested that the unsaturated oleic acid first takes up iodine, that then hydriodic acid is given off, and this acts upon the oleïc acid with the formation of stearic acid and regeneration of iodine.—*Journ. Soc. Chem. Ind.*

The Pharmaceutical Journal.

SATURDAY, JULY 13, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF "MEDICATED" WINE.

THE difficulties arising from the sale of medicated wine still continue to perplex chemists, as may be seen from the Report of the discussion that took place on the subject at the meeting of the North British Branch Executive. Quite recently, also, we have received letters of inquiry as to what may be done in that respect without danger of incurring liability to prosecution by the Excise. Broadly we may reply to these inquiries by stating that in point of fact the sale of any kind of wine whatever without a licence to do so is unlawful. It is really in virtue only of a concession on the part of the Excise authorities that the sale of medicated wine is permissible. This aspect of the matter will perhaps be regarded with some surprise by many of our readers, but it is nevertheless correct, and it will be well to bear in mind that it is the business of the Excise authorities to take measures for preventing the sale of any kind of wine without a proper licence. In the performance of that duty it has, however, long been the custom to recognize certain exceptions in favour of wine that has been so far medicated as to become unsuitable for ordinary use as a beverage. As a case in point we may refer to quinine wine, which has been made the subject of a special general order that can be taken as expressing the principle upon which the action of the Board of Inland Revenue is based. In that order it is stated that orange wine compounded with quinine sulphate in the proportion of one grain of quinine in every ounce of such wine may be sold by druggists without any objection, and without a licence. One of the reasons given for this concession is the fact that such a preparation is described in the British Pharmacopœia as a medicine. But it is not merely on that account the exception is made. A further, and in fact a stronger reason for it is that wine so compounded is no longer fit to be used as a beverage, and that is really the point to which the attention of the Excise authorities has to be directed. We take it that in any similar case where wine is so medicated as to be unfit for use as a beverage, no demand would be made for its sale under a licence. Ipecacuanha wine, as well as the other vinous preparations of the British Pharmacopœia, and probably also pepsin wine, would be allowed to rank in the same category, but in any case the power to decide whether a wine preparation is so far medicated as to be unfit for use as a beverage rests with the Excise authorities, and each case must be decided by them upon its merits. A wine preparation in which the medication is so trifling as not to interfere with such use would certainly be held to need a license for its sale. It is not always that this essential condition of sufficient medication obtains with the so-called medicated wines which are now largely recommended to the public by advertisement. In several instances, it has been shown that they partake of the nature of wine "pick me up," and it is thus that chemists who sell them have been placed in a position of difficulty on the one hand to meet the requirements of their customers and on the other hand to avoid the annoyance of prosecution for breach of the Excise law.

We thoroughly agree with the opinion expressed by Mr. WATT in the discussion above referred to, that it is highly undesirable for the pharmacist to have anything to do with a licence for the sale of wine. To hold such a licence is altogether incompatible with the position a pharmacist ought to occupy. The mischievous results of such trade has been witnessed in America, and it is to be hoped that they may never be experienced here. Bitter complaints are now met with in American journals that in some of the States the drug business has been ruined in this way, and from the first it has been urged that a conscientious druggist had better leave the liquor business severely alone. Even if wine licences were generally taken out by chemists, to allow of the sale of the articles in question, it is doubtful whether the object in view would be achieved. As regards the grocer's licence, which must be obtained through the magistrates, there is reason to believe that any large increase in the number of applicants for it would be likely to provoke opposition from grocers and possibly from temperance advocates. Such opposition might result in refusal of licences to some of the applicants, on the ground that sufficient opportunity was already afforded for the supply of medicated wines by one or two chemists in a town or district having a licence for that purpose. Then the ten pound licence appears to be too costly to be worth taking out, although it has the advantage of being more easily obtainable. On the whole it would seem to be the safer course for chemists to limit their sale of medicated wines to such articles as will meet the requirements of the Excise authorities in being to such an extent really medicated as not to require a licence for their sale. This plan might involve some sacrifice of business, but in the end it would, we believe, be the best policy. As was pointed out by Mr. BOA, many of the so-called medicinal wines

are not really medicinal at all, but are sold for another purpose, and if the sale of such wines by chemists were extended, chemists would be practically brought to the level of the publican. If that were to be the case many of the further difficulties we have already mentioned might be anticipated, and the consequences would be damaging to the interests of chemists. Even the plan we have suggested as a possible one to meet the case, by having a kind of stamp duty to compensate for the licence duty, would not be free from the objection that it would be the means of introducing into the business of the chemist the sale of articles that he had better not have anything to do with.

A NEW AUSTRIAN PHARMACOPŒIA.

A SEVENTH edition of the Austrian Pharmacopœia is now in course of publication. It is now nearly twenty years since the Pharmacopœia that has been in force was issued, and several fresh issues of it have been found necessary meanwhile. This was found to be the case again in 1887, and the Board of Health then considered that the time had arrived for a revision of the work, so as to bring it up the present state of science and to allow of the introduction of new medicinal preparations. The requisite authority having been obtained for the execution of this work, a Committee was appointed for the purpose, consisting of four physicians and three pharmacists. The first work of this Committee was to prepare a list of the drugs and preparations to be included in the new Pharmacopœia. This list was submitted to the heads and clinical professors of the three hospitals in Vienna for consideration, and in order to ascertain whether the articles of materia medica now in general use were sufficiently represented, and which of the older methods of preparation might with propriety be omitted. With the aid of information thus obtained the editing of the Pharmacopæia was then proceeded with. The leading principles upon which this work was carried out were the following. In the selection of medicinal agents for insertion in the Pharmacopœia scientific considerations and clinical experience were taken as guides. By this means all articles were excluded which have at the present time only a limited application, as well as those which are uncertain in their action on account of varying characters, and all drugs that are not ingredients of medicinal preparations, but are only now and then used in making particular preparations. In addition to established articles of the materia medica there have been introduced such of the more modern as have been not only found useful by clinical experience, but also tested by experimental investigation. Regard has also been paid to their origin and constant composition and the means by which this is to be determined.

As regards chemical preparations that are obtainable in commerce of good quality, it was considered that this fact, as well as the difficulty and extra cost of their preparation by pharmacists, were sufficient reasons for not continuing directions for their preparation in the Pharmacopœia. At the same time it was thought all the more necessary to define the particular characters of each of these preparations. In every instance therefore the external appearance and physical characters of these articles are stated, as well as the chemical reactions by which their identity can be ascertained, and their nature determined both qualitatively and quantitatively. Tests for detecting adulteration or deterioration are also given. In regard to drugs of animal or vegetable origin the outward appearances and pharmacognostic characters of each is given, and directions are given as to the state in which they are to be kept in pharmacies. Effect has been given to the gonerally expressed desire for greater uniformity in the preparations of the Pharmacopœia. This object has met with special attention in the case of poisonous preparations, and in the preparation of tinctures and extracts the methods adopted in the principal modern Pharmacopœias have been followed, so far as these are calculated to ensure the greater uniformity and better quality of the several preparations. The rule has been adopted with most of the tinctures to make them so that ten parts represent the soluble constituents obtainable from one part of the drug employed. In the preparation of the extracts of cubebs and male fern, ether has been substituted for alcohol. A large number of the extracts are directed to be prepared by the method of percolation. The amount of hydrocyanic acid in bitter almond water and cherry laurel water has been altered from 0·6 per cent. to 1 per cent., and the amount of arsenious acid in Fowler's solution has been reduced to 1 per cent.

The nomenclature used in the previous edition of the Pharmacopœia has been retained, with the exception that the drugs derived from the vegetable kingdom are arranged in the same order as in manuals and other Pharmacopœias, with the name of the plant yielding a particular drug and a prefix of the part used in medicine, whether bark, leaves, flowers, fruit, seed, etc. The synonyms used in the previous Pharmacopœia, which have now become for the most part obsolete, and are not used much or at all by physicians in their prescriptions, have been omitted from the place they formerly occupied, and placed in a separate list. In the place of these synonyms the names employed in foreign Pharmacopœias have been introduced to meet the more important requirements resulting from increased international intercourse. Considerable additions have been made to the section describing the apparatus and methods of testing, and there are at the end of the work tables giving maximum doses, as well as directions as to the preparations that are to be kept apart from others in a closet that can be locked.

We regret to announce the death on the 6th inst., in her eightieth year, of Mrs. Mary Ann Hellowell, who was elected an annuitant on the Benevolent Fund in 1881.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

The following are the questions that were set for the First or Preliminary examination on Tuesday, July 9:—

LATIN.

(*Time allowed—from* 11 *a.m. to* 12.30 *p.m.*)

I. (*For all Candidates.*) *Translate into Latin:—*

1. I will give the boy a letter.
2. These useful works are not yet finished.
3. Those very beautiful books which were given to my sister by her master have been lost.
4. There is no doubt that many men in that legion fought bravely.
5. Very many ships being broken, when the rest were useless to sail, a great alarm possessed the whole army.

II. Translate into English either A. (Cæsar) or B. (Virgil).

(*Candidates must not attempt both authors.*)

A. CÆSAR.

1. Cæsar hac oratione Lisci Dumnorigem, Divitiaci fratrem, designari sentiebat; sed quod pluribus præsentibus eas res jactari nolebat, celeriter concilium dimittit, Liscum retinet; quærit ex solo ea, quæ in conventu dixerat. Dicit liberius atque audacius. Eadem secreto ab aliis quærit; reperit esse vera. Ipsum esse Dumnorigem, summa audacia, magna apud plebem propter liberalitatem gratia, cupidum rerum novarum; complures annos portoria, reliquaque omnia Æduorum vectigalia, parvo pretio redempta habere, propterea quod illo licente contra liceri audeat nemo.

2. Capto monte et succedentibus nostris, Boii et Tulingi, qui hominum millibus circiter quindecim agmen hostium *claudebant*, et novissimis præsidio erant, ex itinere nostros latere aperto aggressi circumvenere; et id conspicati Helvetii, qui in montem sese *receperant*, rursus instare et proelium redintegrare *cœperunt*. Romani conversa signa bipartito *intulerunt*: prima ac secunda acies, ut victis ac summotis resisteret; tertia, ut venientes exciperet.

Grammatical Questions.—For those only who take Cæsar.

1. Decline in full—*eas res*, *complures annos*, *illo licente* (Par. 1).
2. Write in full the indicative present and subjunctive perfect of the verbs in italics (Par. 2).
3. Parse the following words:—*quæ*, *audacius*, *redempta*, *liceri* (Par 1).
4. How in Latin do you express motion *to* and *from*, and position *at*, with names of cities? Give some examples.

B. VIRGIL.

1. "*Aspice* bis senos, lætantes agmine, cycnos,
   Aetheria quos lapsa plaga Jovis ales aperto
   Turbabat cœlo: nunc terras ordine longo
   Aut capere, aut captas jam despectare *videntur*.
   Ut reduces illi *ludunt* stridentibus alis,
   Et coetu cinxere polum, cantusque dedere;
   Haud aliter puppesque tuæ pubesque tuorum
   Aut portum *tenet*, aut pleno subit ostia velo.
   Perge modo, et, qua te ducit via, dirige gressum."
2. Huc cursus fuit,
   Quum subito assurgens fluctu nimbosus Orion
   In vada cæca tulit, penitusque procacibus Austris
   Perque undas, superante salo, perque invia saxa
   Dispulit; huc pauci vestris adnavimus oris.
   Quod genus hoc hominum? quæve hunc tam barbara morem
   Permittit patria? hospitio prohibemur arenæ:
   Bella cient, primaque vetant consistere terra.

Grammatical Questions.—For those only who take Virgil.

1. Decline in full—*vestris oris*, *hoc genus* (Par. 2).
2. Write in full the indicative present and subjunctive perfect of the verbs in italics (Par. 1).
3. Parse the following words:—*captas*, *aliter*, *qua*, *dirige* (Par. 1).
4. How in Latin do you express motion *to* and *from*, and position *at*, with names of cities? Give some examples.

ARITHMETIC.

(*Time allowed—from* 12.30 *p.m. to* 2 *p.m.*)

[The working of these questions, as well as the answers, must be written out in full.]

1. A farmer refused an offer of 2½ guineas a quarter for 237½ quarters of wheat; he afterwards sold 126 quarters of it at £2 15*s.* 9*d.* a quarter, and the remainder at £2 8*s.* 4*d.* a quarter. What did he gain or lose in consequence of the delay?
2. After the value of a business had been increased by $\frac{5}{6}$, $\frac{7}{36}$ of it was sold for £164,368 1*s.*; find its original value.
3. Subtract ·03 from $\dot{0}\dot{3}$, and divide the result by $\cdot 10\dot{2}$.
4. Reduce $10{\cdot}41\dot{6}$ of 633 sq. po. — 11·15 of 3 ac. 7 po. + 7·6 of 14 ro. 5 po. to the decimal of 6⅔ acres.

*5. Write down the Metric system of weight, and give the equivalents in English weights.

*6. If 20 men can dig a trench 160 metres long, 2 metres wide, and 1 metre 2 decim. deep in 8 days, what will be the depth of a similar trench 90 metres long, 1 metre 80 centim. broad, which 24 men can dig in 4½ days?

7. Find the cost of papering a room 16¾ ft. long, 13¼ ft. broad, 10½ ft. high, with paper 2½ ft. wide at 3½*d.* a yard?

ENGLISH.

(*Time allowed—from* 3 *p.m. to* 4.30 *p.m.*)

1. Analyse the following:—

   "*Ill* fared it then with Rhoderick Dhu
   That on the field his targe he threw,
   Whose brazen studs and tough *bull-hide*
   Had death so often *dashed* aside."

2. Parse the words in italics in question 1.
3. Correct the following sentences, giving your reasons:—
   (i.) Either I or thou is making a mistake.
   (ii.) Neither poverty or riches were injurious to him.
   (iii.) I should not differ with them if I was him.
4. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where necessary:—but when they reminded him of the ruin which he had brought on his brave and loving followers of the blood which had been shed of the souls which had been sent unprepared to the great account he was touched and said in a softened voice i do own that i am sorry that it ever happened they prayed with him long and fervently and he joined in their petitions till they invoked a blessing on the king he remained silent sir said one of the assistants do you not pray for the king with us.

†5. Write a short composition on one of the following subjects:—
   (i.) Sources of happiness.
   (ii.) The force of example.
   (iii.) Thrift.
   (iv.) "Reading maketh a full man, conference a ready man, and writing an exact man."

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* At least one of these two questions must be attempted by every candidate.

† This must be attempted by every Candidate.

JACOB BELL SCHOLARSHIPS AND REDWOOD SCHOLARSHIP, 1889.

The following are the questions that were set at the examination for the above Scholarships, held on Tuesday, July 9:—

Part I.—Time allowed, three hours (11 *to* 2).

In awarding marks the neatness and legibility of the writing will be taken into account.

Notice.—In framing Answers, Candidates should not enlarge upon the Questions, but should confine themselves to giving, as briefly and clearly as they can, the information required.

LATIN.

Translate into English:—

1. Tum vero omne mihi visum considere in ignes
Ilium, et ex imo verti Neptunia Troja.
Ac, veluti summis antiquam in montibus ornum
Quum ferro accisam crebrisque bipennibus instant
Eruere agricolæ certatim; illa usque minatur,
Et tremefacta comam concusso vertice nutat:
Vulneribus donec paulatim evicta, supremum
Congemuit, traxitque jugis avulsa ruinam.
Descendo, ac, ducente Deo, flammam inter et hostes
Expedior; dant tela locum, flammæque recedunt.
Ast ubi jam patriæ perventum ad limina sedis,
Antiquasque domos, genitor, quem tollere in altos
Optabam primum montes, primumque petebam,
Abnegat excisâ vitam producere Trojâ,
Exsiliumque pati
Vergilii Æneis. Lib. ii., 624–638.

2. Give perfect and supine of *concusso*, *evicta*, *avulsa* and *tollere*; compare *imo* and *summis*; parse *ornum*, *comam* and *ducente*; decline in the plural *bipennibus*, *vulneribus*, *locum* and *domos*; why was *Troja* called *Neptunia*?

ENGLISH.

1. Parse fully the words in italics in the following lines:—

"*His years but* young, *but* his experience *old*;
His head *unmelloved*, but his *judgment* ripe;
And, in a word (*for far* behind his worth
Come all the praises that I now bestow),
He is complete in feature and in mind,
With all good *grace to grace* a gentleman."

2. Write a short essay on one of the following subjects:—

The Cultivation of a Hobby. Cycling. The French Revolution.

ARITHMETIC.

1. What decimal divided by 0·48 will equal—

$\frac{9}{10}$ of $6\frac{7}{8}+\frac{4}{7}$ of $\frac{1}{2}+7\frac{1}{2}$?

2. What is the weight in centigrams of thirty minims of glycerin having a specific gravity of 1·260?

3. What fraction must be added to—

$$\frac{4\frac{1}{2}+7\frac{2}{3}}{13\frac{1}{4}-9\frac{2}{3}} \times 1\frac{5}{28} \div \frac{2\frac{1}{4}+3\frac{5}{6}}{8\frac{1}{5}-1\frac{3}{10}}$$

that the sum may be equal to 6?

4. What sum of money will amount to £797 9*s.* 7*d.* in $3\frac{1}{2}$ years at $7\frac{1}{2}$ per cent. simple interest?

FRENCH OR GERMAN.

The candidate is at liberty to choose either French or German, and is not required to show a knowledge of both. Marks will only be awarded for one.

French.

1. Translate into English:—

Spenser fut le poète célèbre sous Elisabeth. L'auteur éclipsé de Macbeth et de Richard III. se montrait à peine dans les rayons du *Calendrier du berger* et de la *Reine des fées*. Montmorency, Biron, Sully, tour à tour ambassadeurs de France auprès d'Elisabeth et de Jacques I^er^, entendirent-ils jamais parler d'un baladin, acteur dans ses propres farces et dans celles des autres? Prononcèrent-ils jamais le nom, si barbare en Français, de *Shakespeare*? Soupçonnèrent-ils qu'il y avait là une gloire devant laquelle leurs, honneurs, leurs pompes, leurs rangs, viendraient s'abimer? Hé bien! le comédien de tréteaux, chargé du rôle du spectre dans *Hamlet*, était le grand fantôme, l'ombre du moyen âge qui se levait sur le monde, comme l'astre de la nuit, au moment où le moyen âge achevait de descendre parmi les morts: siècles énormes que Dante ouvrit, que ferma Shakespeare.

CHATEAUBRIAND, Essai sur la Littérature Anglaise.

2. Translate into French:—

The lion never attacks man unless he is provoked. Henry, who rode there, arrived first. Be calm, I will neither act against you nor against them.

German.

1. Translate into English:—

Alexander der Grosze kam auf seinem Zuge nach Asien durch eine Sandwüste, in der kein Wasser zu finden war. Endlich brachte ein Soldat etwas in seinem Helme dem Könige, der eben so sehr wie das ganze Heer vor Durst lechzte. "Wie" sagte Alexander, "soll ich der Einzige sein, der da trinkt, während meine braven Kameraden verdursten? Nein, das will ich nicht," und mit diesen Worten gosz er das edle Getränk in den brennenden Sand. Die Krieger, erstaunt über diese Groszthat riefen mit Jauchzen: "Führe uns wohin du willst, edler König, wir sind nicht ermattet, unter einem solchen Fürsten halten wir uns nicht für sterblich."

2. Translate into German:—

Why ought we to honour father and mother? in order that we may live long upon earth. What is there written on that window? I read the words: "French spoken here."

Part II.—Time allowed: Two hours (3 *to* 5).

Chemistry and Pharmacy.

1. What is meant by the quantivalence of an element, and how is it expressed symbolically? Give examples of univalent, bivalent, trivalent and quadrivalent atoms.

2. State the source, mode of preparation, and tests for phosphorus, and describe its chief characters.

3. Describe the official process by which Acidum Phosphoricum Concentratum is made, and explain the reaction by means of an equation. State what precautions are necessary to be observed in preparing it.

4. How is Liquor Ferri Dialysatus made, and what is the nature of the product so called?

5. Define dialysis, and state some of its possible applications to Pharmacy.

Botany.

1. What functions does Starch perform, and in what parts of plants is it found most abundantly?

2. Describe briefly the principal forms of inflorescence, and name the chief varieties of the "spike."

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The Council of the Society held the usual stated monthly meeting at the offices, 11, Harcourt Street, Dublin, on Wednesday, July 3.

There were present, Dr. Tichborne and Messrs. Charles Evans, W. Hayes, Payne, Simpson, Merrin, McConnell, Beggs, W. F. Wells, jun., and Dr. Gordon.

On the motion of Mr. Payne, seconded by Mr. Wells, the chair was taken by Dr. Tichborne.

The Chairman: Gentlemen, before we proceed to our general business I may say I have great pleasure in seeing amongst us two new members, one of whom I am sure we all feel delighted to see once more

amongst us; and the other we all welcome as a new member of the body.

Mr. Ferrall, Registrar, then read the minutes of the previous meeting.

Mr. Payne raised a question as to whether Dr. Whitla, of Belfast, not being a member of the Council, could be elected one of the Committee to organise for a conference of the Pharmaceutical body in London next year.

The Chairman thought they could appoint anyone they liked.

Mr. Payne: My reason for raising the question was that when I read the Journal I thought it was Mr. Whitla, a member of the Council, that was appointed. However, I do not press the matter, more particularly as the appointment made is a most desirable one.

The matter dropped.

Mr. Wells drew attention to the fact that there was no entry in the minutes of the objection having been raised at the last meeting, that seven members were not present when the President and Vice-President signified their intention to resign.

Mr. Hayes said that the meeting was a legally constituted one, even though seven members were not then present, as the requisite number were in attendance when business commenced, but left before this particular business came on and before the meeting had adjourned.

The Chairman said the objection had certainly been raised that the meeting was not a lawfully constituted one, seven members not being present at the time of the resignation, but the minutes did not record the fact.

Mr. Hayes admitted that the objection was raised.

Mr. Payne said it was his idea that no resolution could be passed without seven members being present. It was resolved to amend the minutes by recording the fact that the objection had been raised, but was afterwards withdrawn.

The Chairman: The next business before us, gentlemen, is the very important question of electing a President.

Mr. Wells: I rise with great pleasure to propose a gentleman for the office of President, and I think it is only necessary to mention the name of Mr. Charles Evans, to meet with the approbation of every member around the table. I have known Mr. Evans for a great many years, and I know that as to his standing in pharmacy you could not have a man holding a better or a more honoured position in the city of Dublin. He is able, with the assistance of his brother, to carry on the first pharmacy business in the three kingdoms, and surely if he is able to fill that position with credit to himself and satisfaction to his customers, he ought to be able to carry on the business of this Society with honour to himself. In his presence I will say no more than that. I have great pleasure in proposing Mr. Evans as President of the Society.

Mr. Payne: It gives me the greatest possible pleasure to second the proposal. It is unnecessary for me to say it is of the utmost importance we should have a good practical President, and one to be always found on the spot. That is one of the necessities of the Society, that the President should be resident in the city. As Mr. Wells has observed, Mr. Evans is connected with one of the principal pharmacies in the three kingdoms. Therefore I think that the young men who are coming forward need have no fear that their President would treat them unfairly in any way. The licentiates must also feel confidence that Mr. Evans, understanding the practice of pharmacy, in him they will have one who will look after their every interest. I have great pleasure in seconding the nomination of Mr. Evans as President of the Society.

The Chairman: I do not like to say too much, because Mr. Evans is present, but I do not think you could possibly have made a better choice, if we consider the point already dwelt upon, that from the fact of Mr. Evans being one of the practical workers of one of the most important establishments in Dublin, he is thoroughly identified with the interests of the licentiates. He understands their requirements, and therefore the appointment is a most desirable one from that point of view. Independently of that, Mr. Evans has fulfilled, greatly to our satisfaction, the post of Examiner. This will make him appreciative of the wants and requirements of the forthcoming candidates for the license of this Society. Therefore I think you could not possibly have made a better appointment.

Mr. Hayes: I have great pleasure in supporting the proposition. I do not think that from among the members of this Society you could have selected one who will give more universal satisfaction from his position in pharmacy, his gentlemanly demeanour on every occasion, and his ability to hold the position. Having spoken to his brother at first when we found ourselves without a President—Mr. Charles Evans was absent—his brother said he did not think he would undertake the duties, and on his return home, on making further inquiry, I heard he had declined, but when I heard again that there was a possibility of changing his mind, it gave me the utmost satisfaction to feel that such a gentleman would be at the head of this Council. Perhaps some of our members think that I, with some other members, or late members, of the Council, do not take an interest in pharmacy or in the prosperity of the Society, because everything has not gone on as we desired, but those who think so are greatly mistaken; at all events, I can speak from my own personal knowledge and personal feeling in the the matter. I look on this Society as a child of my own. Our late Treasurer, Mr. Hodgson, and I, took the leading part in getting the Act passed which gave us the position we occupy as a Pharmaceutical Society in this country, and therefore I must always feel a deep interest in the work of the Society, even though I am not put on the Council. At all events I have great pleasure in supporting the proposition that Mr. Evans be President of the Society. I hope that he will find it convenient to continue in that position for the longest period that he can retain it.

The Chairman put the motion, and declared it passed unanimously.

Mr. Evans then took the chair amidst applause.

The President: Gentlemen, before proceeding with our business, will you allow me to thank you very sincerely for the honour you have conferred upon me by electing me President of the Society. I deeply regret the course that has obliged you to elect a new President at such a time, and that you were unable to persuade our worthy friend, Professor Tichborne, to fill the office this time, knowing that he could fill it better than I; but as it is the unanimous desire of the Council that I should accept the office, I do so with great pleasure. I trust that our labours in the future will be for the benefit of the Society, and that our duties will be discharged free from any remarks that might cause friction, however slight.

Mr. Hayes: I beg to propose the election of a Vice-President. I am sure we all feel gratified at seeing among us to-day Mr. Payne, whom I look upon as one of our leading northern lights. It was with very great regret that I heard of his resignation some time ago. However, he is here among us again, and though it may not be as convenient to you, sir, as if you had the Vice-President on the spot to refer matters of difficulty to, yet the facilities for travelling between Dublin and Belfast are so great that I think it would be an advantage to the Council and to the Society to have as Vice-President a member we could all look up to and feel he would be always found when it became necessary to

take his advice, or put him in your place in case of your temporary absence. I need not say anything about Mr. Payne more than that we all feel very happy at his presence among us to-day, and I trust he may long continue to assist in the work of the Society. I have great pleasure in proposing Mr. Payne as Vice-President of the Society.

Dr. Tichborne: Perhaps you will allow me the privilege of seconding that proposal. For a long time I have been a strong advocate for paying a country member the compliment of having one of them Vice-President, and we could not do better than by selecting the important city of Belfast for the honour. There is another reason why we are lucky in having a man of such experience as Mr. Payne. We all know how he worked in connection with the Society on committees and in other ways that makes him a most desirable Vice-President. Therefore it gives me great pleasure to second the proposal.

Mr. Wells said he always thought that Belfast being such a place as it is it would be only right to have their Vice-President there. Belfast was almost as large as Dublin, and as far as pharmacy was concerned it might be more strongly represented there than in Dublin. Therefore he was very much pleased to see Mr. Payne selected for this office. Mr. Payne had a great interest in the Society, and he could not be surpassed by any member of the Council. He had worked for them in the north of Ireland and in committees in a way that the Society knew nothing about, and it was only reasonable they should pay him the honour and through him Belfast.

Mr. Simpson said Mr. Payne had always taken a great interest in the Society, and came regularly to the meetings, often when they did not expect him to come such a long distance. He hoped he would for a long time continue to be their Vice-President.

The President, in putting the motion to the meeting, said they could not have made a better choice, and he was much pleased Mr. Payne was to have the burden with him, for when he looked back at the able men who preceded him in the President's chair he was somewhat diffident in accepting the post. He had great pleasure in declaring the resolution unanimously passed.

Mr. Payne in returning thanks said, I little thought a month ago that I should be a member of the Council of the Pharmaceutical Society of Ireland again to-day. I can assure you it was with a feeling of sorrow that I found it necessary to separate myself from you some two years ago. As some of you know I was the first Licentiate of the Society who was elected on the Council. Therefore, like Mr. Hayes, I still have a practical interest in it. I had nothing to do with the original formation of the Society, but I had a great deal to do with the working out of the resolutions and regulations that were framed after the Council got into working order. I should not have attempted to take the post which you so kindly thought me fit to take, had I not been assured of the help of your President, Mr. Evans. I take it that my duty will be very light indeed. Therefore, I cannot help thanking you for the honour you have shown the city of Belfast in electing me as Vice-President, and in thanking you also for the honour you have done myself.

The Registrar read a letter from Mr. Allen, resigning his seat on all committees.

Mr. Payne suggested that Mr. Allen should be asked to retain his position on the committees until October, with a view of reconsidering his letter.

Mr. Simpson said that Mr. Allen had always taken a great interest in the Society, and had been on the committees since its formation, and was a regular attendant.

Mr. Hayes seconded Mr. Payne's proposition, which was passed unanimously.

The Registrar read a letter from Mr. Hodgson, resigning his seat on the Council, in consequence of the President and Vice-President having resigned their positions.

Dr. Tichborne thought that the resignation of Mr. Hodgson, their Treasurer, would entail a great loss to the Society, and he therefore proposed that he be requested to reconsider his resignation.

Mr. Hayes seconded the motion, which was supported by Mr. Wells and Mr. Payne, who thought it would be a great calamity to the Society to lose the services of so valuable a member.

The President, in putting the motion, which was unanimously adopted, said he was greatly pleased they came to such a unanimous decision, as the loss of Mr. Hodgson to the Society would be most deplorable.

The Registrar next read a letter from Mr. John F. McArdle, enclosing a practical pharmacy certificate, signed by Mr. John Henry, father of the late Mr. George Ambrose Henry, L.P.S.I., for approval. Mr. McArdle, the Registrar explained, had been in Mr. Henry's employment before he became a licentiate of the Society, and he had written to him to the effect that his time could only count from the date when Mr. Henry became a licentiate.

The action of the Registrar was approved of, and it was resolved that an affidavit should be had from Mr. Henry's father that Mr. McArdle was in his son's employment from the date of obtaining his license until his death.

The Registrar then read a letter from Mr. Samuel J. Smith, forwarding certificates received from the Intermediate Education Board for Ireland for acceptance in lieu of the Society's Preliminary examination.

Mr. Simpson pointed out that although the certificates were of a very high order they did not include the subjects of botany or chemistry, which the rules of the Society required.

On the motion of Mr. Payne, seconded by Mr. Wells, it was resolved to inform Mr. Smith that if the General Medical Council passed him on the intermediate certificates they would adopt the action of the Medical Council.

The Council then went into Committee for the purpose of considering some alleged breaches of the Act.

On resuming business,

The Registrar reported a donation from the Pharmacy Board of New Zealand, of copy of the Pharmaceutical Register of New Zealand for 1889.

Mr. Beggs moved a vote of thanks to the Board for their donation.

Dr. Gordon seconded the motion, which passed unanimously.

The Registrar read report from the Certificates Committee, which was adopted.

Mr. Wells proposed, and Mr. Whitla seconded, that Mr. Samuel R. Henry, L.P.S.I., of the Diamond, Monaghan, be admitted a member of the Society.

Motion passed unanimously.

Mr. Merrin proposed that Mr. John M'Clelland, L.P.S.I., of the Medical Hall, Ballyshannon, be admitted a member of the Society.

Mr. M'Cormack seconded the motion, which was adopted.

On the motion of Mr. Baxter, seconded by Mr. D'Arcy, Mr. Thos. O'Connor, L.P.S.I., of the Medical Hall, Dungarvon, was admitted a member of the Society.

The Registrar reported that Messrs. Casey and Clay, solicitors, had furnished an account *re* the Pharmacy Amendment Bill, amounting to £10 10*s*.

Referred to the Law Committee.

Mr. Payne said he had a communication to make from some pharmacies in Belfast to the President and members of the Council. The last communication he had made was not very well received, but he had no

doubt this would be better received. It was to propose the following as members of the Society:—Wm. Pratt, L.P.S.I., Medical Hall, 20, Castle Place, Belfast; Johnston Montgomery, L.P.S.I., Medical Hall, Royal Avenue, Belfast; James Tate, L.P.S.I., Medical Hall, 9, Royal Avenue, Belfast; Andrew McNaught, L.P.S.I., Medical Hall, 32, Schomberg Terrace, Belfast; George A. Webb, L.P.S.I., Medical Hall, 141, York Street, Belfast; David W. Elliott, L.P.S.I., Medical Hall, 36, Royal Avenue, Belfast; James R. Cochrane, L.P.S.I, Medical Hall, Antrim Road, Belfast; John B. Robinson, L.P.S.I., Medical Hall, Crumlin Road, Belfast; James W. Nicholl, L.P.S.I., Medical Hall, 25, High Street, Belfast; Patrick J. Lyons, L.P.S.I., Medical Hall, 120, Royal Avenue, Belfast; Wm. C. Dobbin, L.P.S.I., North Street, Belfast; Hustin Lanceshire, L.P.S.I., Medical Hall, 68, Church Street, Ballymena; James Walker, L.P.S.I., Medical Hall, High Street, Ballinaheuch; John B. Hay, L.P.S.I., Medical Hall, County Square, Newtownards; Solomon Donovan, L.P.S.I., Medical Hall, Main Street, Larne.

Mr. Wells said he would second the election of these gentlemen. Their joining showed they approved of the action taken by himself and others.

The motion was unanimously adopted.

Mr. Wells proposed, and Mr. McCreary-Hill seconded, that the following be elected members of the Society:—John Simpson Robinson, Robert Jones, Cavan; Thos. Dawson Tate, Robert John Galvey, Henry Cunningham, John J. Bernard, John Smith, L.P.S.I., 49, Dawson Street, Dublin; James North Hardy, L.P.S.I., 17, Lower Sackville Street.

Motion passed unanimously.

The Registrar reported the names of the persons who had entered for the examinations for the Licenses which took place on 3rd, 4th and 5th inst., and also for the Preliminary examinations on the 1st prox.

On the motion of Mr. Wells, it was resolved to allow the Irish Pharmaceutical Chemists' Association to hold their meetings at the offices of the Society when the room would not be required by the Council of the Society.

The proceedings then terminated.

July Examinations.

Preliminary:—Messrs. Stewart, Montgomery, Watson, Beck, Cleeland, McClean (Lees, McLoughlin, Murray), Doyle, (Evans, and Kennedy) passed.

Seven were rejected.

License:—Messrs. Whelan, Herriott, Clark, Shanks, Anderson, Forrest and Bourke.

Nine were rejected.

Society of Chemical Industry.

NINTH ANNUAL MEETING.

The ninth annual meeting of this Society was held on Wednesday, July 10, in the Theatre of the Royal Institution, Albermarle Street, Mr. Ludwig Mond, President, in the chair.

Mr. Cresswell (Secretary) having read the minutes of the last meeting, which were duly confirmed, Mr. Levinstein, of Manchester, and Mr. Allen, of Sheffield, were appointed Scrutators.

Report of the Council.

Mr. Cresswell then read the report of the Council as follows:—

"The Council has the honour to report that the membership of the Society has increased from 2395, as reported at the last meeting, to 2445, or a net increase of 50 members. During the year 223 members have been elected, and 173 have been removed by death, resignation, and other causes.

"The losses by death have been unusually heavy, and include the following names eminent in pure and applied science:—Dr. J. Peter Griess, F.R.S., the discoverer of the azo-compounds; Dr. Wm. Wallace, City Analyst of Glasgow, an authority on sanitation; J. J. Coleman, Chairman of the Glasgow and Scottish Section, the inventor of the Bell-Coleman mechanical dry air refrigerator; R. D. Silva, Professor of Analytical Chemistry at the Ecole Centrale, Paris; John Williams, a Vice-President of our Society, and at one time President of the Pharmaceutical Society, an authority of great weight in pharmacy, and one whose genial presence and counsel we greatly miss; Dr. Warren de la Rue, F.R.S., a former President of the Chemical Society, whose researches in chemistry, electricity and astronomy are historical: Dr. R. S. Newall, F.R.S., identified with the invention of wire rope and the manufacture of submarine cables: and Dr. John Percy, F.R.S., late President of the Iron and Steel Institute, author of 'Percy's Metallurgy.'

"During the year 55 papers and 5 communications have appeared in the Journal. Our thanks are due to those who have favoured the Society by reading these papers.

"The Journal daily increases in importance as a work of reference, and every effort is made by the Publication Committee to add to its value. Within the last few weeks Mr. Watson Smith has arranged to give up his lectureship at the Victoria University, and, taking up his abode in London, has agreed to make the editing of the Journal his main occupation, and this on terms which, after full deliberation, have been deemed satisfactory. The Council hopes that, in securing for the future his services, which have been so valuable in the past, it has promoted the best interests of the Society, in whose continued prosperity the Journal is so important a factor.

"This step has been rendered possible by the satisfactory state of our finances. On June 21 last the Treasurer reported the sum of £3688 15*s.* 9*d.* invested and £1214 4*s.* 5*d.* in the bank, as against £2088 11*s.* 9*d.* invested and £1761 12*s.* 9*d.* in the bank a year ago. The revenue last year, as will be seen from the balance sheet, amounted to £918 14*s.* 9*d.* more than the expenditure, due mainly to increased profit from advertisements in the Journal, and economies in printing and publishing effected without in the least detracting from the quality of the Journal. This year the profits from advertisements will be less, as the Council has agreed to accept a lower sum, on the representation of the publishers, who had over-estimated the returns from this source.

"The increased salary of the Editor under the arrangement alluded to above, the cost of providing further office accommodation, the cost of housing and binding the books presented by Mr. Raphael Weldon, referred to in the last report, and the improbability of large accessions of members in the future, render this surplus most welcome, and we are thus enabled to face the future with confidence and hope.

"Among minor matters connected with the Journal, the following may be mentioned:—A new class called 'Photographic Materials and Processes' has been added to the Journal and Patent Literature, the code of rules for those engaged in the production of the Journal have been revised, the Journal is now printed in uniform type throughout, and we shall publish at the end of 1890 a collective subject-matter index of the first nine volumes."

From the Statement of Revenue and Expenditure it appeared that the total revenue of the Society during the year 1888 had amounted to £3681 13*s.* 8*d.*, the principal items being £2991 17*s.* 10*d.* received in subscriptions and £780 3*s.* 10*d.* for journals sold and advertisements. The expenditure, including £1951 7*s.* 11*d.* on account of the Journal, amounted in

the same time to £2762 18*s.* 11*d.*, leaving a balance of revenue over expenditure amounting to £918 14*s.* 9*d.*

Mr. Hugo Müller moved that the report of the Council be adopted, which was seconded by Mr. Makin, and carried unanimously.

Mr. Rider-Cook (Treasurer) said he would not read the balance-sheet, as it was already in the members' hands. Although they had invested £1500 this year, there was at present over £1200 in hand, which would be sufficient to carry them on until the receipts from next year came in. The investments had been £770, being the amount received for life compositions, and £3000, the balance of receipts over expenditure.

The President moved, and Mr. Spiller seconded, a vote of thanks to Mr. Rider-Cook, which was carried unanimously.

Mr. Makin then moved the re-appointment of Messrs. Theobald Bros. and Mall as Auditors. This was seconded by Mr. John Pattinson, and carried.

The Next Annual Meeting.

Professor F. Clowes, of Nottingham, in moving that the next meeting be held in Nottingham, said the programme at present was only a sketch, but if the Society thought fit to accept the invitation, and attend in large numbers, he could promise that every effort would be made to make the visit a pleasant one.

Sir Lowthian Bell seconded the motion, which was carried unanimously.

The President's Address.

The President, after alluding to the remarks he made at the Inaugural Meeting of the Society in 1881, proceeded to give an account of the work he has been engaged in for many years, in relation to obtaining new and abundant supplies of ammonia and to investigations connected therewith. He referred to the great value of ammonia as manure, more particularly for the old world, which now imports from South America 650,000 tons of nitrate of soda, a substitute for ammonia, representing a value of £6,500,000, and to the immense importance of saving this expenditure by securing this commodity from sources at our own command.

After referring briefly to the processes in use and proposed for producing ammonia, Mr. Mond described his own researches for obtaining this product from the nitrogen of the atmosphere, which after trying a great many different methods he found possible by improving a process invented by Messrs. Sourdeval and Margueritte, which consists in heating a mixture of carbonate of barium and carbon in the presence of nitrogen, thereby producing cyanide of barium. This being treated with steam yields ammonia and regenerates the carbonate of barium employed.

In consequence of the difficulty of finding retorts which would last at the high temperature required this process was not persevered in, particularly as Mr. Mond had in the meantime found that it was possible to obtain a very large supply of ammonia from the immense store of combined nitrogen in any coal at a reasonable cost.

Mr. Mond proceeded to describe in detail the process he has adopted and the plant he uses for obtaining ammonia from coal, which is burnt by means of a mixture of air and steam in gas producers. The ammonia is recovered from the gas by absorbing it in scrubbers with sulphuric acid. By subsequently washing the gas in another scrubber with water, which becomes heated by the steam contained in the gas, and using the hot water so obtained in another scrubber for warming the air used in the producers, and saturating it at a temperature of 76° C. with moisture, Mr. Mond has succeeded in recovering the greater part of the steam required for this process, and thus to render it more economical. Mr. Mond obtains for every ton of fuel burnt in the producers gas and tar equivalent in heating power to 80 per cent. of the fuel used, and in addition 70 lbs. of sulphate of ammonia, which can thus be produced on a large scale at a cost of about £5 per ton, exclusive of maintenance and depreciation, and which at present fetches £12 per ton in the market. Mr. Mond does, however, not think that this process is suitable for small consumers of fuel. The total quantity of sulphate of ammonia which could in this way be obtained from the 150,000,000 tons of coal annually consumed in the United Kingdom would be 5,000,000 tons, so that it would suffice to treat one-tenth of this total consumption of fuel to produce the 500,000 tons of ammonia required to replace the whole of the nitrate of soda now imported into Europe.

Mr. Mond subsequently described a gas battery invented by himself and Dr. Carl Langer, which has been designed to produce electricity direct from the gases made in his producers; and a new process for converting the carbonic oxide and carbohydrates contained in these gases into their equivalent of hydrogen, by passing them together with steam over metallic nickel or cobalt at a moderate temperature, so as to make them suitable for use in the gas battery. It was shown long ago by Mr. Justice Grove that two strips of platinum partly immersed in dilute sulphuric acid, one in contact with hydrogen and the other with oxygen, produced electricity, and acting on this idea Dr. Carl Langer had been at work under his direction, and he would now call attention to the last result of their extended labours, which they hoped would mark a great step in advance in the economical production of electricity. The distinguishing feature was that the electrolyte was not employed as a liquid, but in a *quasi* solid form, and the name of Dry Gas Battery had therefore been given to it. It consisted of a number of elements, which were formed of porous diaphragms of non-conducting material; in this instance, plaster of Paris impregnated with dilute sulphuric acid. Both sides of these diaphragms were covered with very fine platinum leaf perforated with numerous small holes; over this was a thin film of platinum black, and these coatings were in contact with frameworks of lead and antimony, insulated from each other, which conducted the electricity to the poles of the battery. The diaphragm lying between the two frames was covered with an insulating mixture on the inside, the ribs of the frame being in contact with the platinum leaf, and the electricity passing through these ribs to the poles of each individual element. The leaf was the finest which could be procured, and was perforated. These elements were put together into sets side by side with insulating frames of paste-board between, so as to form narrow chambers on both sides of the diaphragm, and through these chambers were passed on one side of each element a current of gas containing hydrogen, and on the other side a current of air. Such a battery of seven elements was exhibited, producing enough current to keep a small glow lamp in action. This construction enabled a very large amount of duty to be got out of a small quantity of platinum. A battery of seven elements in a total effective surface of half a square metre contained only 2½ grams of leaf and seven grams of platinum black, and it produced a current of 2 ampères, and 5 volts or 10 watts, when the outer resistance was properly adjusted, which was equal to nearly 50 per cent. of the total energy obtainable from the hydrogen absorbed in the battery. This was an immense increase upon the best results obtained by steam engines and dynamos, which do not utilize more than 8 per cent. of the energy in the fuel employed. Mr. Mond concluded his address, which was illustrated by models, diagrams and the gas battery in full work, by remarking that the saying, "necessity is the mother of invention," no longer

holds good in our days when by the progress of science we are enabled to foresee and forestall our wants, but that it may truly be said that steady methodical research is the father of industrial progress.

Sir Lowthian Bell then proposed a vote of thanks to the President for his address. He remembered at different periods various substances being put forward as a mark of the civilization of the people. Dr. Moore had said that sulphuric acid was the most accurate exponent of the civilization of a nation, but this had given way to soap. After what they had heard that morning he should be inclined to make soap give way to ammonia, as sulphuric acid in its turn had given way to soap. Anyone, therefore, who showed a nation how to produce ammonia plentifully and at small cost was a great benefactor to his country.

Mr. J. C. Stevenson, M.P., in seconding the motion said, no paper could be more interesting and valuable than the one they had heard from the President. He was struck in listening to the early part of the paper with the valuable services Mr. Mond had rendered in investigating the old processes devised for the manufacture of ammonia.

The vote of thanks was carried by acclamation and briefly acknowledged by the President.

The New Council.

The scrutators then brought in their report, the list of persons elected as the executive for the ensuing year being as follows:—President, Sir Lowthian Bell, Bart., F.R.S.; Vice-Presidents, R. Forbes Carpenter, Prof. F. Clowes, D.Sc., Sir J. Neilson Cuthbertson, Prof. James Dewar, F.R.S., Jas. Duncan, Dr. John Evans, F.R.S., S. H. Johnson, Ludwig Mond, Dr. Hugo Müller, F.R.S., Dr. W. H. Perkin, F.R.S., Dr. Edw. Schunck, F.R.S., Prof. W. A. Tilden, F.R.S.; Members of Council, L. Archbutt, S. B. Boulton, Jno. Brock, Jno. Calderwood, Alexander M. Chance, A. E. Fletcher, B. E. R. Newlands, Jno. Pattinson, Jno. Spiller, E. C. C. Stanford, J. C. Stevenson, M.P., A. Norman Tate; Treasurer, E. Rider Cook; Foreign Secretary, Dr. Ferdinand Hurter.

The President then moved a vote of thanks to the manager of the Royal Institution, by whose kindness the members were able to hold the meeting in that historic building. This motion having been seconded was carried unanimously.

The President then moved a vote of thanks to the officers of the sections, and to the editor and staff of the Journal, which was seconded by Mr. David Howard and passed unanimously.

Visit to Messrs. Doulton's Works.—In the afternoon a number of the members assembled in the Art Pottery Show Rooms of Messrs. Doulton, on the Albert Embankment, where luncheon was provided for them by the company. Afterwards the members visited the studios and chemical sanitary potteries.

Conversazione.—In the evening the President, Mr. Ludwig Mond, held a Reception and Conversazione in the Grosvenor Picture Gallery, New Bond Street, which was very numerously attended.

On Thursday, the arrangements included a steamboat excursion from London Bridge to Hammersmith to inspect the Manbré Saccharine Company's Works, followed by a visit to Kew Gardens, and then by the Annual Dinner at the "Star and Garter," Richmond.

On Friday, the programme included visits to Truman, Hanbury, Buxton and Co's. Brewery, Spitalfields; Cowan's Sugar Refinery, Barnes; the new Kingston and Surbiton Sewage Works; the Brush Electric Light and Engineering Company's Works, Lambeth; Brin's Oxygen Company's Works, Westminster; and Tebbit Brothers' Works, Bermondsey, to see Groth's Electric Tanning Process in operation.

Proceedings of Societies in London.

ROYAL COLLEGE OF PHYSICIANS.

[CROONIAN LECTURE.]

RELATION BETWEEN CHEMICAL STRUCTURE AND PHYSIOLOGICAL ACTION.

BY T. LAUDER BRUNTON, M.D., F.R.S.

(*Continued from Vol. XIX., page* 1067.)

ANTISEPTICS IN LOCAL DISEASES.

The application of germicides is not only useful in cases where the microbes form poisons, which by their absorption may cause general poisoning, but is also of service where the microbes produce only local mischief. Thus, resorcin and iodoform have been of great service in the treatment of skin diseases, such as lupus, where the disease appears to depend upon, or at least to be constantly associated with, the presence of bacillus. In such diseases it is easy to apply the remedy freely to the part affected, and also at the same time to remove such parts of the tissue as have been completely infiltrated with the microbes. Even malignant disease has been said to yield to the influence of local antiseptic treatment, and a spindle-cell sarcoma of the tonsil is said to have disappeared under the action of iodoform, although confirmation of such a result is desirable.

TREATMENT OF CONSUMPTION.

The most important result which could be obtained by the local use of antiseptics would certainly be the cure of consumption, and numerous have been the attempts to destroy the tubercle bacillus in the lung by means of antiseptic remedies, either inhaled or conveyed to the lungs through the blood. Carbolic acid, salicylic acid, aromatic oils of various sorts, and especially eucalyptus oil, have been employed as sprays or inhalations, and iodoform has both been inhaled and applied by insufflation, especially in cases where the tubercle has affected the larynx. In laryngeal phthisis these insufflations are certainly of use, and even where the disease is confined to the lung a certain amount of amelioration of the symptoms has followed the use of antiseptic measures. It has not been shown that any real cure has been effected by them, and this is not at all wonderful when we consider the difficulty of applying them locally in such a way as to destroy the bacillus without affecting the delicate structures of the lung itself. But the idea seemed feasible that one might be able to introduce into the blood some substance which, during its excretion by the lung, would have an antiseptic action and destroy the microbes without damaging the pulmonary tissues. Accordingly, the treatment of phthisis by enemata, containing sulphuretted hydrogen diluted with carbonic acid, was suggested and largely employed for a short time. It was stated by Claude Bernard that sulphuretted hydrogen is very rapidly eliminated by the lungs; so rapidly, indeed, that hardly any passes into the left side of the heart and arterial system. Therefore the risk of poisoning by enemata of the gas ought to be very small; yet Orfila had shown many years before that enemata of sulphuretted hydrogen might cause poisoning very rapidly. A case of poisoning by the formation of this gas in the intestines has been recorded by Senator, and experiments by Cash and myself on the absorption of gas from the intestines confirmed Orfila's results. The practice, therefore, seemed not to be without risk, and the occurrence of a fatal case, as well as the smallness of the beneficial results which have been obtained from it, have caused the practice to fall into disuse.

The principle, however, appears to be rather a good one, and the direction in which one would now look is

for some substance which would undergo slow decomposition in the intestine or in the body generally, and give rise to volatile antiseptic products which would be slowly but constantly eliminated by the lungs, so that during the whole twenty-four hours the tubercle bacilli would be exposed to its action. Though a volatile substance which would be excreted by the lungs is most likely to be beneficial, yet perhaps it is not absolutely necessary that it should be volatile. A soluble substance circulating in the blood might be efficacious if it possessed a specific power to destroy the tubercle bacillus without injuring the tissues of the lung or acting as a poison to other organs of the body. Such properties are said to be possessed by helenin, which M. Korab found to destroy tubercle bacilli when kept in contact with them. This is a form of camphor which occurs along with alantic oil and alantic acid in the root of elecampane (*Inula helenium*). These are all, like other forms of camphor, antiseptics, arresting putrefaction, but having in addition a special power to destroy tubercle. The experiments of Marpmann appear to show that the latter two substances may possibly be useful, as animals to which they were administered did not die when inoculated with tubercle, while others similarly inoculated and which did not receive the medicine died. They have no injurious action upon man, and after their prolonged administration to phthisical patients, the tubercle bacilli disappeared from the sputum. In cases of phthisis where I have prescribed helenin the patients appeared to improve.

In a most suggestive paper by Dr. Burdon Sanderson he mentioned the destructive effect which phenylpropionic acids had been shown by Klein and Lingard to exert upon the bacillus tuberculosis. In consequence of this Dr. Theodore Williams tried these substances in cases of phthisis, and apparently with very good results. They may, however, sometimes cause sickness and discomfort in the patient, and are not quite so well borne as helenin. Farther trials are required in order to establish the utility of any of these substances, and to ascertain whether other remedies, having a similar character, may not be discovered and found to be more efficacious.

Action of Microbes in the Blood and Tissues.

We may now turn from the consideration of microbes and their action when in contact with mucous membranes or raw surfaces to their effect after they have gained an entrance into the circulation. The bacilli of anthrax and of septicæmia in mice probably produce their effect chiefly in the blood, while other poisons, such as those of measles, rötheln, scarlet fever, small-pox, acute rheumatism and tetanus, probably act more upon the tissues. Various theories have been proposed as to the mode in which the anthrax bacillus causes death. One idea was that the bacilli, by aggregating together, blocked the capillaries and caused embolism; a second was that they produced a ferment which decomposed the tissues; a third is that they give rise to one or more definite poisons. It is quite possible that all these theories may be, to a certain extent, correct, and that each of them may represent one factor in the production of the symptoms. The third of them is probably the most important, however, and the symptoms probably depend chiefly upon the formation of the poison. Indeed, Hoffa has obtained from pure cultures of the bacillus anthracis a ptomaine which produces the symptoms of anthrax, and death when subcutaneously injected; but it is not unlikely that the presence of a ferment may aid the anthrax bacillus in the production of a poison. Pasteur showed that the anthrax bacilli did not produce a ferment which was capable of causing the disease when injected, for by filtering the blood of animals suffering from anthrax through porous cylinders, and thus keeping back the bacilli, he obtained a filtrate which was inactive. In all probability, any ferment which the bacilli had formed would have passed through in the filtrate, and would have produced the ordinary symptoms after injection; but Nencki proved this in a way still more free from objection, for he inoculated gelatine jelly with anthrax bacilli. These liquefied the gelatine and fell to the bottom, and the clear liquid which remained above produced no effect on animals. Wooldridge, indeed, claims to have transmitted the toxic power of anthrax to vegetable albumen, organisms being absent.

These experiments appear to prove that if the anthrax bacilli produce a ferment at all, it is incapable of producing the disease. At the same time one must remember that after the injection either of the vegetable ferment, papain, or of sterilized septic blood into animals, Rossbach and Rosenberger found their blood swarming with bacilli. This observation seems to show that the ferment had rendered the blood more suitable for the rapid growth and multiplication of the bacilli.

Puerperal Fever.—In puerperal fever it is probable that the production of ptomaines in the tissues plays an important part, for Bouget isolated several toxic bases from the viscera of a woman who had died of this disease. This would not by itself prove that these poisons had been formed during life, and were not simply the products of putrefaction, but he also obtained from the urine of patients similar bases which were highly toxic, and killed frogs and guinea-pigs when administered by injection. The amount of poison in the urine was greatest when the symptoms were most severe, and diminished when the patients recovered. This fact appears to indicate a connection not only between the poison and the disease but between the gravity of the disease and the amount of poison.

Tetanus.—The pathology of tetanus was for a long time doubtful, and it was frequently ascribed to reflex excitability of the nerve centres due to the irritation of a cicatrix. It is now shown to be in all probability dependent on a bacillus present in earth or other matter contaminating a wound. The difficulty of thoroughly cleansing the infective matter from slight punctures, and the risk of wounds about the hand becoming afterwards infected even when thoroughly cleansed at first, explains why tetanus should so frequently follow very trivial injuries.

When animals are inoculated with matter taken from suppurating point or with the medulla of animals which have died of tetanus, the disease is reproduced, and on microscopic examination a bacillus has been found to be present. From pure cultivations of this bacillus Brieger obtained four poisons. The first, tetanine, produces tetanus in mice when injected in minute quantity. Another, which he has not named, also causes tetanus, along with a free flow of saliva and tears. Another, tetanatoxine, first produces tremor, then paralysis, and lastly violent convulsions. A fourth, spasmotoxine, causes severe convulsions both clonic and tonic. This discovery of Brieger's renders it probable that the convulsions in tetanus are due to the action of a poison, but we cannot at once assume that this poison necessarily circulates in quantities with the blood, especially as the flesh of animals which have died of the disease may be eaten with impunity.* It is quite possible that it may be formed either entirely or chiefly in the nerve centres, and that only very small quantities of it pass into the general circulation.

Hydrophobia.—In hydrophobia this is very probably the case, and Anrep says that he has isolated a ptomaine from the brain and medulla oblongata of rab-

* Sormani, *Rendiconti del Reale Instituto Lombardo*, March 28, 1889, quoted in *Nature*, May 2, 1889, p. 21.

bits suffering from a severe form of rabies. This ptomaine is very poisonous, and minute doses cause the earlier symptoms of rabies, while large doses cause the phenomena usually observed in the latter period of the disease. A gradual habituation of the animal to small doses of the ptomaine produced a certain degree of immunity.*

Diphtheria.—From cultivations of diphtheria Roux and Yersin have obtained a soluble poison which may cause the symptoms of diphtheria in various degrees of intensity according to the dose. A large dose may cause rapid death, a smaller one may produce paralysis, ending fatally, while a still smaller one may cause only temporary paralysis.†

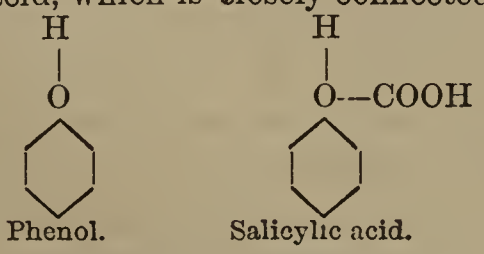
This poison, however, is not a ptomaine, that is, it is not of an alkaloidal nature. It appears to be rather allied to ferments, and is destroyed by boiling for ten minutes. The results of experiments already made render it hopeful that it may be possible by its means to confer immunity from the disease, but this is not yet certain.

Treatment of Diseases Depending upon Infection of the Blood or Tissues by Microbes.

There are two lines of treatment which one would naturally pursue. The first is to destroy the microbes or so weaken them that the leucocytes of the blood or the cells of the tissues may be able to complete their destruction. The second is either to eliminate the poisons they have formed, or to use some remedy which will antagonise their action.

The difficulty of destroying microbes by drugs is still greater in the circulation and tissues than it is in the intestinal canal, or in any of the body cavities; for here the comparative solubility of a remedy will not help us. We require one which will destroy the microbes without injuring, or at any rate without injuring to any great extent, the cells of any of the tissues, for it will be carried to them all by the blood. It is quite clear that if the microbes are few in number, so that the fight between them and the leucocytes or tissue cells is a fairly even one, the balance may be turned by the use of a drug which will hurt the microbes more than the organisms. Even if it should be somewhat injurious to both, the quantity required to kill the microbes will do the organism no great harm, and the total result will be a cure; but if the microbes are very abundant the antiseptic dose required to destroy them may be so great that it would of itself be poisonous to the diseased animal. We can thus see that experiments with the same remedy may yield very different results in the hands of different observers, and that while some may laud it as a certain cure, others might regard it as of no use whatever. From its general antiseptic power carbolic acid was likely to be the remedy first tried, and Bouley, Davaine, and others employed it in cases of anthrax with a certain amount of success.

Salicylic acid, which is closely connected with carbolic acid in its composition, differing from it by the introduction of the carboxyl group, has also been tried in a great number of infective diseases. In most of them it has been of little use, but in acute rheumatism it certainly lessens the pain and reduces temperature, giving the patient great relief. Whether it cuts short the disease, however, is a question which is not yet finally settled, although possibly the difference in opinion on this subject may be partly due to the different modes in which it is administered. It is evident, however, that amongst the enormous number of antiseptic compounds we may yet expect to find many drugs which may be useful as disinfectants in the blood and tissues.



Phenol. Salicylic acid.

Treatment by Elimination: Purgation: Diuresis.—Another method consists, as I have mentioned, in increased elimination. Free purgation was formerly resorted to, and apparently in many instances with good results, nor is this to be wondered at when we learn that fæces contain large quantities of ptomaines as well as of microbes.

But the most ready channel for the elimination of soluble poisons is the urine, and diuretics have long been used in the treatment of febrile diseases, and are still trusted as amongst the most efficient remedies. Acetate of ammonia with spirit of nitrous ether are still amongst the most favourite remedies as antipyretics.

Washing Poisons out of the System.—One of the best diuretics is a free supply of water, and Ringer pointed out the possibility of lessening the effect of poisons by washing them, as it were, rapidly out of the system.* This plan has recently been followed by Sanquirico,† with very striking results. In his experiments he injected quantities of a weak saline solution directly into the veins, immediately after the poison had been administered, or just when the symptoms of poisoning began to appear. By treatment in this way he found that three times the ordinary lethal dose of strychnine had to be administered before death occurred. The poisonous action of chloral, alcohol, urethane, paraldehyde, caffeine, and aconitine was also diminished, but not very much, while that of morphine and nicotine was unaffected. In all cases the beneficial effect of the treatment was most marked when the diuresis was greatest. No doubt the effect of fluids is likely to be greater when they are introduced directly into the veins than when they are introduced indirectly through the alimentary canal, but the effect in both cases will be the same in kind, though different in degree. I think we sometimes follow this plan unwittingly in febrile diseases by feeding the patient on milk, and more especially on milk diluted with soda and potash water. We thus administer a larger quantity of liquid than we would otherwise be likely to do, and the carbonic acid in the effervescing water tends both to aid absorption from the stomach and to stimulate excretion by the kidneys.

Leucomaines.—With the exception of peptotoxine, which is formed by the action of pepsine, I have hitherto spoken of alkaloids which owe their formation to microbes, and which are called ptomaines. But the cells of living organisms also break down albuminous matter in the course of the functional activity, and alkaloids are formed in the healthy body, to which the name of leucomaines has been given. An interesting observation has been made by Bouchard, to the effect that the alkaloids formed during sleep have a stimulating action, so that when they accumulate to a certain extent they tend to excite the nervous system and make the person awake. Those, on the other hand, which are formed during the waking hours have a depressant action, and tend to bring about a condition of sleep. There is thus a sort of self-regulation in the processes of life, by which waking and sleeping are alternately ensured. To this point, however, I shall have to refer again in considering the action of soporifics.

Uræmia.—In health all the poisonous substances formed during tissue-change are excreted chiefly in

* Anrep, *Vratch*, No. 2, 1889, p. 52, abstracted in the *British Medical Journal*, Feb. 9, 1889, p. 319.

† Roux and Yersin, *Annales de l'Institut Pasteur*, 1888, Nos. 11 and 12.

* Husemann, *Arzneimittellehre*, 2te Aufl., p. 570.

† Rossbach, *Berl. klin. Woch.*, 1889, No. 42.

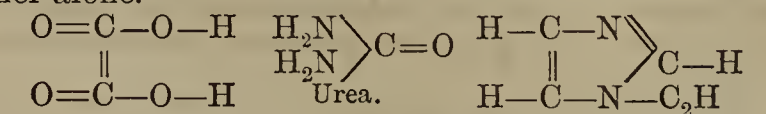
the urine; but when the kidneys are diseased, or have been in any way rendered functionally inactive, the alkaloids may accumulate and give rise to those symptoms of poisoning which are usually known by the name of uræmia. In cases of disease of the kidney where such a condition has been threatening, an exclusively milk diet proves of the greatest service, and probably does so in a great measure by washing the poison out in the way I have just mentioned, although it is also likely that such a diet tends to limit their production. The objection may be raised that in a good deal of what I have just been saying there is no very obvious relation to chemical constitution. This is quite true, because, though Brieger has pointed out that most of the alkaloids that he has obtained are either amines or diamines, or else more complicated compounds of nitrogen and carbon allied to uric acid, yet the chemical structure of many of those formed in the body either in health or disease has yet to be discovered. When we know their chemical nature we may be able, in a case of uræmic poisoning, at once to administer an antagonistic remedy and save our patient, instead of standing, as at present, almost hopelessly by. A knowledge of the relation of chemical constitution to physiological action is likely to guide us also in our investigations regarding the nature of the poisons of the uræmia. One set of poisons is probably allied to uric acid, and may include guanidine, methyl-guanidine, and other derivatives of urea.

In health the greatest parts of the products of albuminous waste are excreted by man in the form of urea; uric acid occurs only to a small extent. But in various disturbances of nutrition we find that the quantity of uric acid is greatly increased, and that sometimes along with it oxalate of lime makes its appearance. We might, therefore, naturally look for compounds of oxalic acid as among the substances likely to give rise to symptoms of poisoning if retained in the body.

Symptoms of Uræmia.—For my own part, I have sometimes been struck with the extremely rapid pulse in cases of uræmia, although there was no rise of temperature to account for it. This rapidity could hardly occur unless the vagus were either paralysed or inactive, and resembled so much the effect of atropine that I have been inclined sometimes to think that an atropine-like body was giving rise to the symptoms.

Hypothesis as to the Nature of the Poison in Uræmia.—Now there is a substance allied in its chemical constitution to oxalic acid, namely, oxalethylene, which has the power of paralysing the vagus and producing great rapidity of the pulse, just like atropine, which it also resembles in its action upon the pupil and brain, dilating the pupil and exciting the brain. When one atom of hydrogen in this body is replaced by chlorine so as to form chlor-oxal-ethyline, we obtain a body which no longer dilates the pupil, acts upon the brain like morphine, but still paralyses the vagus. We thus have a group of symptoms which closely correspond with those occurring in certain cases of uræmia. Should this substance, or any one nearly allied to it, be found to be present in cases of uræmia, experiments could readily be instituted with a view of finding antagonistic compounds, and the end we desire might be attained. In some cases of uræmia the injection of pilocarpine has arrested the convulsions, and it appears to me more likely to have produced these effects by antagonising the convulsing compound, than simply by producing profuse sweating, although such an action might possibly tend to help elimination. This appears to be more likely from the observation of Sänger that pilocarpine is only of use before the occurrence of coma, for this symptom probably indicates either the presence of another alkaloid not antagonised by pilocarpine or an accumulation of poison to an extent which cannot be neutralized.

In Fraser's experiments on antagonism he showed that, while atropine and physostigmine counteracted each other up to a certain point, yet when the dose was too great the presence of both appeared to cause death even more quickly than either the one or the other alone.



Oxalic acid. Urea. Ethyl-glyoxal-ethyline or oxalethylene.

PREVENTIVE TREATMENT OF INFECTIVE DISEASES.

In the early part of my lectures I mentioned that just as we can prevent the growth of a crop by destroying the seed or rendering the soil barren, so we may prevent the occurrence of infective diseases, either by destroying the microbes which form the disease germs or by altering the soil, namely, the organism in which they are to grow. We read in history of an ancient custom of rendering the soil of an enemy's city, which had been rased to the ground barren and waste by sowing it with salt, and in our day we see a similar plan made use of to prevent the growth of grass and weeds on gravel walks. The beneficial results of vaccination for small-pox showed the possibility of sterilizing the organism for particular microbes, so that they could no longer thrive in it; and Pasteur's treatment of anthrax with a weakened virus induced men to ask the question—How is insusceptibility to disease induced? and to try whether it was possible to prevent disease by the administration of chemical substances instead of by inoculation with microbes. One of the most powerful of all disinfectants is corrosive sublimate, and it has the advantage of exerting its antiseptic powers in all kinds of liquids. Koch used it, but without success, as a cure for anthrax, administering it after the disease had already been established. Cash administered it to animals as a preventive, and found that those which had received it for some time before inoculation remained well, while those not so treated died after inoculation. The possibility of preventing infective disease by the administration of remedies was thus proved. Pasteur, with the prophetic insight of true genius, arrived at the conclusion that the active agent in preventing hydrophobia was a chemical substance formed by a microbe and not the microbe itself, and upon this idea his plan of preventing hydrophobia is based. Wooldridge found that when anthrax bacilli were cultivated in beef broth, and the bacilli themselves were removed by filtration, the filtrate containing, as it did, the products which they had formed during their growth rendered an animal into which it was injected proof against anthrax inoculated afterwards. Pasteur and Perdrix found that the blood of animals suffering from anthrax when sterilized and injected into rabbits appeared to protect them against subsequent inoculation. Chantemesse and Vidal have found that the administration of sterilized cultures of the typhoid bacillus protects against subsequent inoculation with germs, and similar results have been obtained by Roux and Chamberland in regard to septicæmia.

Salmon and Smith have found that a similar treatment with a sterilized culture of the hog bacillus will protect pigeons against inoculation of the said disease, but they have not yet succeeded in protecting pigs. Lately, also, Pasteur and his assistants have succeeded in cultivating the organism which gives rise to diphtheria. They find that the poison which it produces is most virulent, so that an exceedingly minute quantity of it will produce death. Like the disease itself, this poison will produce paralysis of motor nerves, and it seems probable that the symptoms of the disease are, to a great extent, due to the absorption of the poison from the surface of mucous membrane upon which it is formed. This poison appears not to be of an alkaloidal nature, but rather of an albuminous

character, and it is allied to ferments by the fact that it is quickly destroyed by boiling. Inoculation with minute doses of the poison, gradually increased in quantity, will finally not only render an animal insusceptible to the large quantities of the poison, but protect it against the diphtheria when the disease germs themselves are afterwards inoculated.

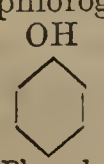
MODE OF ACTION OF PREVENTIVE INOCULATION.

The tolerance of poison which has been established in the case of diphtheria is probably similar in its character to what occurs during the habitual use of morphine. But perhaps the simplest case of acquired toleration is observed in salmon and other fishes which live at one time in salt, and at another in fresh, water. If such a fish be transferred directly from sea water to river water, or *vice versâ*, it would quickly die, the water to which it was unaccustomed at the time acting as a poison to it. But if the transition occur gradually, as it does in the migrations of the fish, where it passes from salt water to brackish, and then to fresh, or *vice versâ*, the tissues of its body, especially of its gills, become adapted to the gradual change, and no harm ensues. In the ordinary course of invasion of an organism by microbes, the microbes appear to have the power of secreting some substances which will destroy the cells of the organism. If these are, however, protected against the poison by previous gradual inurement to its action, they resist the microbes and destroy them. The whole subject is still in its infancy, but the results already obtained raise great expectations for the future. There is one point, however, which seems doubtful, and that is the duration of the immunity which may be thus conferred.

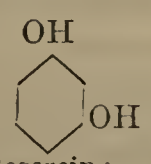
Sewill has found that by inoculation with small quantities of snake venom, he can establish a certain tolerance for larger quantities of the poison injected at once; but this tolerance wears off after six months, so that it rather resembles the tolerance which is established for morphine by its continuous use than the immunity against small-pox which is conferred by vaccination. It is possible that the germs of a disease may establish in the cells of the organism which it attacks a power of producing some substance inimical to their growth, and that this power may continue for years unchanged without any external evidence of its presence. Possibly some evidence of such an alteration might be found by careful examination of the poisons excreted in the urine of an animal before and after preventive inoculation of anthrax, and careful comparison of the action of these substances upon the life of anthrax bacilli. But the whole question is a very wide one, and an enormous amount of patient and laborious investigation will be required before we get any accurate knowledge on the subject.

CHEMICAL STRUCTURE AS AN INDICATION TO THE CHOICE OF ANTISEPTICS.

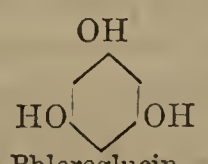
But there is one inquiry which is of still more immediate practical interest, and that is, which compound is likely to be most powerful as an antiseptic, and least likely to produce at the same time unpleasant or dangerous symptoms. Phenol itself has an antipyretic action, but its poisonous and antipyretic properties run too nearly parallel to allow of its being much used to reduce temperature. On comparing the action of phenol with similar compounds in which two or three atoms are replaced by hydroxyl instead of one, as in phenol, it has been found that the toxic action is, upon the whole, rather increased with the increased number of hydroxyl groups, phenol being hardly so poisonous as resorcin, and this in its turn less poisonous than phloroglucin.



Phenol.



Resorcin.



Phloroglucin.

The rapidity of action of these drugs is in inverse ratio to their toxic power; phenol, which is less toxic, acts most quickly, and phloroglucin mostly slowly. Resorcin is apparently intermediate.

But we have not merely to consider the number of hydroxyl groups in the body. We must consider also their position in relation to the benzene nucleus. This nucleus consists of six carbon atoms united together to form a close ring, and to each one an atom of hydrogen is attached, so that we have six hydrogen atoms attached to six carbons, and the formula is C_6H_6. It is not quite certain how the carbon atoms are united amongst themselves. According to Kekulé, they are alternately united by double and single affinities, while others have proposed connections between atoms on opposite sides of the ring.

We must bear in mind that this ring is simply hypothetic, but it gives us a convenient means both of representing aromatic substances and of studying their relationship.

Whatever the real nature of the connection may be, it appears that the benzene nucleus is symmetrical; and that if we replace an atom of hydrogen in it by hydroxyl, chlorine, methyl, or any other radical, the product is the same whichever atom of hydrogen is replaced. But, if we replace a second atom, the case is different, for the fact that one atom in the original nucleus has been already replaced has rendered the nucleus unsymmetrical. If the second replacement occurs on a carbon atom next to the first, it is represented in a formula by the figures 1 : 2, and is said to be in the ortho position. If on the next atom but one it is represented in a formula by 1 : 3, and is said to be in the meta position, and if in the next but two, it is represented as 1 : 4, and is said to be in the para position. The position of radicals replacing hydrogen in the benzene nucleus affects the chemical behaviour of the compound very considerably.

Thus if an alkyl, such as methyl, be attached to one carbon atom, the attachment of a second negative radical, such as hydroxyl, to the nucleus in the ortho position prevents its oxidation in acid solutions, but hastens it in alkaline ones, and there can be little doubt that the relative position of the radicals attached to the benzene nucleus will affect the processes of oxidation and reduction which it undergoes in the organism, as much as it would do in the hands of a chemist. We have, perhaps, too few data as yet to come to a definite conclusion regarding the exact alterations which the position of a group in the benzene nucleus will effect in its physiological action, but a number of most interesting data have already been obtained. Thus it has been found that in the case of the dioxybenzenes, where two hydroxyls occupy the ortho position, the action is most powerful. It is weakest in the meta position, and is intermediate in the para position in the benzene nucleus.

In the case of the trioxybenzenes where we have three hydroxyls, we find that when these are in position, 1, 2, 3, or are consecutive, as it is termed, the toxic action is greater than when they are in the position 1, 3, 5. In the first instance, as in pyrogallol, any two hydroxyls are to each other in the ortho position, whereas in the second, phloroglucin, any two are in the meta position to each other. If we replace the hydroxyl in phenol by carboxyl (COOH), we lessen its toxic power very considerably, though the substance we obtain—benzoic acid—still has considerable antiseptic power. If we replace one atom of hydrogen in the benzene nucleus by hydroxyl, and a second by carboxyl, we find that the same rule holds good as for the di-oxy compounds. Here, too, the rule regarding position holds good, for salicylic acid, in which the hydroxyl and carboxyl are in the ortho position, is more powerful than either of its congeners meta and para-oxy-benzoic acid, in which they are in the meta and para position respectively.

Provincial Transactions.

ABERDEEN AND NORTH OF SCOTLAND SOCIETY OF CHEMISTS AND DRUGGISTS.

As previously arranged the outing this year took the form of a picnic, and was held at Paradise, Monymusk, through the kindness of Sir Arthur Grant, Baronet.

The party met at the appointed rendezvous at 9.30 a.m. (on Wednesday, 3rd inst.), when there were in waiting two "four-in-hands," which were soon comfortably filled with 35 pleasure seekers. The day was fine, the sun scorching, and dust *ad lib.*, in a perfect state of pulverization. After a pleasant ride of an hour and a half, Dunecht—the local residence of the Earl of Crawford and Balcarres—was reached, where refreshments were served. The company was then, through the kindness of Dr. Becker (the Earl's astronomer), shown over the observatory—which by the way is soon to be removed to Edinburgh. Afterwards the party enjoyed a pleasant ride through the "policies," passing the spot where the late Earl's body lay hid, and which is now marked by a handsome granite monument with a descriptive inscription and the words:—"Astra: Castra: Numen: Lumen: Munimem."

After a further ride of about an hour and a half Monymusk was reached, the party walking up to Paradise. On the island a most sumptuous lunch was waiting the weary wayfarers and was most amply done justice to. After lunch a few complimentary toasts were neatly and humorously proposed and replied to. The company seemed loth to leave the cool breezes and shady walks of Paradise and it was well nigh 6 p.m. ere many had left.

Tea was served to the ladies in the Grant Arms Hotel, Monymusk, and at 7 p.m. the "four-in-hands" were again in waiting.

After a drive of 2½ hours, Aberdeen was again reached by way of Kennap—with its mineral springs—and the Hill of Tyrebagger (tire-the-beggar).

Parliamentary and Law Proceedings.

Supposed Poisoning by a Narcotic.

An inquest was held at Buckland, Hampshire, on the 9th inst., before Deputy-Coroner Lapthorne, touching the death of John Bloomfield, seven months old. It appeared that the child being unwell the mother took it to Mr. Harry Lea, assistant to Mr. Merrett, Kingston Road, and he gave her two powders, one of which she was to administer at once. Soon after the powder was taken the child was sick, in the evening it became drowsy, and slept all that night and throughout the whole of Sunday. At intervals it became sufficiently aroused to take the breast, but dropped off to sleep again immediately. At seven o'clock on Sunday evening, as the child continued to be drowsy, Dr. Emmett was summoned.

Dr. Emmett said that he found the child was under the influence of a narcotic. He took possession of one of the powders given by Mr. Lea, sealed it, and handed it to the police. From the first he was convinced that it was a hopeless case. Mr. Lea had shown him how he made up the powder, and if the ingredients were as administered to the child in question, the powder was quite harmless It was a strong powder for a delicate child, but there was no narcotic in the powder made up in his presence by Mr. Lea. Coma, due to a narcotic, was the cause of death.

Mr. Harry Lea, who volunteered his evidence, said he was manager to Mr. Merrett. Mrs. Broomfield came to the shop on Saturday evening and asked for a teething powder. She told him that the child was restless and very fretful. He gave her two powders out of twelve that he had made that morning. Each powder contained quarter grain calomel, half grain of scammony, and two grains of sugar. The powder that he showed to Dr. Emmett was one of the twelve. He had sold the remaining powders after the doctor left the shop; and he was sorry now that he had done so; but he had received no complaints. He did not consider the dose he gave would be injurious to any child. The dose was so small that he did not think it worth while to inquire as to the health of the child. He did not think it was possible for an opiate to have got into this powder by accident.

The jury were divided on the question as to whether the powder should be analysed, there being five for and eight against.

The Coroner said the only verdict possible was that death was the result of narcotic poisoning, but by whom administered there was no evidence to show.

The jury returned a verdict in accordance with this direction.

Obituary.

Notice has been received of the death of the following:—

On the 19th June, at Shilton, near Coventry, suddenly, while on a visit, Mr. Isaac Dickson Adcock, Chemist and Druggist, High Street, Alcester. Aged 54 years. Mr. Adcock had been a Member of the Pharmaceutical Society since 1875.

On the 4th of July after a brief illness, Mr. Francis Earle, Pharmaceutical Chemist, Market Place, Hull. Aged 54 years. Mr. Earle had been a member of the Pharmaceutical Society since 1861, and for a period of about eight years filled the office of Local Secretary. He was also for two years a member of the Executive of the Trade Association. Mr. Earle was much respected by his fellow-townsmen, and a large concourse attended his funeral, among whom were the President, Vice-President, and Honorary Secretary and most of the members of the Hull Chemists' Association.

On the 5th of July, Mr. John Dymoke Elliott, Chemist and Druggist, Woolwich Road, Greenwich. Aged 78 years.

ANSWERS TO CORRESPONDENTS.

Erratum.—In the List of Local Secretaries, page 11, after Carmarthen *read* "Lloyd, Walter," *instead* of "Davies, Richard Morgan."

Forceps.—We are not acquainted with any compound that answers to your requirements.

Sherringham.—Listera ovata.

A. H. Allen.—We have received from Mr. A. H. Allen a copy of a lengthy correspondence between himself and Professor Dunstan in reference to the methods of analysing nitrites by the use of a nitrometer and by titration with iodide of potassium. Mr. Allen appears to think that the Professor should have made special mention of his name, as connected with the introduction of these methods, in the paper that was published in this Journal, March 16, p. 741. We fail however to perceive that any such mention was necessary, inasmuch as both methods had then become to such an extent general property as to make special reference to their originators or improvers unnecessary.

A. Coleman.—We think it very undesirable to prolong a vague discussion of the matter referred to in your letter.

Cymro.—The occurrence of germs in the favourable nidus afforded by the ammonium salt.

L. M. C.—You will find a reply to your inquiry on another page of the Journal this week.

Communications, Letters, etc., have been received from Messrs. Clague, Downes, Walker, Trooke and Co., Umney, Lawson, Revilo, Subscriber since 1842.

PICRASMA QUASSIOIDES, BENN.

BY W. DYMOCK AND C. J. H. WARDEN.

This plant, a native of the sub-tropical Himalaya and China, is a small tree or large bush with unequally pinnate leaves, and the aspect and foliage of *Ailantus*. It bears axillary stalked cymes of small diæcious or polygamous flowers, which have the calyx four- or five-parted. The fruit is a pea-like, red drupe, and is edible. Royle first drew attention to the bark and wood as being quite as bitter as quassia, and Stewart states that the leaves are used in the Punjab to cure scabies, and the wood to kill insects. The bark has been recommended by Macardieu as a febrifuge, and under the name of *Brucea* (*Nima*) *quassioides*, the plant is noticed as a likely substitute for quassia in the Indian Pharmacopœia. In this work the bark is said to be sold under the name of *Bharangi* in Bengal; but this we are unable to confirm, as several samples of bharangi which we have obtained in Bengal and elsewhere all proved to be the roots and stems of *Clerodendron serratum*. In the Punjab Himalaya, from whence we obtained the wood, the tree is known as *Kashshing*.

The wood consists of pieces of the larger branches from three to six inches in diameter; it is covered with a dark brown bark, which has a somewhat netted surface, and is marked by transverse scars. On rubbing off the outer layer of suber an olive-green surface is exposed. The bark from a stem of 3 inches in diameter was $\frac{1}{8}$ inch thick and very compact. The wood and bark are of a light yellow colour; in the former a transverse section shows numerous fine, close medullary rays which intersect well-marked, irregular rings. The centre of the stem is occupied by a cylinder of pith. In short, in appearance and taste the drug bears a close resemblance to quassia.

Under the microscope a transverse section of the bark exhibits an outer layer of brown suber, within which are two or three rows of empty transparent cells, followed by eight to ten rows of cells containing chlorophyll; these are succeeded by the liber tissue, which is divided into layers by about six rows of yellow stone cells; lastly comes the cambium layer. The medullary rays consist of about fifteen vertical layers of cells; the single layers contain from one to five rows of cells. The tissue of the bark contains resinous deposits and crystals of oxalate of lime, which are so numerous towards the exterior portion that they produce opaque patches, visible to the naked eye.

The wood so closely agrees with the microscopic description of quassia by Pocklington (*Pharm. Journ.*, [3], v., 321; 'Year Book,' 1875, p. 190), that we think it unnecessary to reproduce the particulars.

Chemical Examination.—The wood reduced to fine powder, and dried at 100° C., lost 5·46 per cent. of moisture. The ash amounted to 1·61 per cent.; there was nothing special to note regarding its composition; it did not contain any trace of manganese.

In order to determine the nature of the bitter principle, 30 grams of the air dried powder were exhausted with 80 per cent. alcohol in the cold, and the resulting tincture evaporated to dryness; the weight of the alcoholic extract dried at 100° C. was 4·46 per cent. During percolation of the powder the percolate exhibited a most marked greenish fluorescence, while the liquid was of a yellow colour.

The alcoholic extract, which was of a dark brown colour, was mixed with water and acidulated with acetic acid, and the turbid mixture repeatedly agitated with ether. During agitation dark yellowish amorphous particles separated. The ethereal solution was bright yellow, and did not exhibit any fluorescence; its extract dried at 100° C. amounted to 0·66 per cent. The amorphous particles, insoluable in ether, dried at the same temperature, amounted to 0·293 per cent. These fractions we term A and AA respectively. They will be further referred to later.

The aqueous acid solution after separation of the ether was repeatedly agitated with benzole. The benzole solution did not exhibit any fluorescence; its extract amounted to 0·035 per cent. (extract B.). The aqueous solution, after separation of benzole, was made slightly alkaline with carbonate of soda and repeatedly agitated with chloroform. The chloroform solution exhibited a very marked greenish fluorescence. The extract amounted to 0·076 per cent. (extract C).

Lastly the alkaline aqueous solution was agitated again with benzole; the extract amounted to 0·012 per cent. (extract D). Regarding the properties of these various fractions we made the following notes:—

Extract A was yellow and soft; on heating with water a bright yellow solution was obtained, and a light yellow-coloured soft residue left. The yellow aqueous solution was strongly bitter; it yielded no precipitate with Mayer's reagent; with tannic acid it gave a white precipitate, and yellow flocks with phosphomolybdic acid.

Resin AA, which was insoluble in ether, was easily dissolved by alcohol, a very dilute solution showing a most marked green fluorescence. Examined spectroscopically no absorption bands could be detected; there was, however, marked absorption towards the violet end of the spectrum. The alcoholic solution was strongly bitter. In water this principle did not dissolve, either in the cold or on heating. In alkaline hydrate solutions it was soluble, yielding a brownish-yellow solution from which acids precipitated reddish-yellow flocks. On agitating this turbid, acid mixture with chloroform, the chloroform became slightly coloured, but was not fluorescent and the flocks remained undissolved. The chloroform left on evaporation a trace of residue which was strongly bitter. The insoluble flocks were washed and dissolved in alcohol, in which they were now readily soluble; the alcoholic solution did not exhibit any fluorescence; it was very bitter.

Benzole extract B was slightly yellowish and indistinctly crystalline; it had an odour like that of violets, and was extremely bitter. In alcohol it was soluble, the solution exhibiting a slight greenish fluorescence.

Chloroform extract C was slightly yellowish; residue very bitter, soluble in alcohol, with marked greenish fluorescence.

Benzole extract D was yellowish and very bitter. The above-described extracts, with the exception of AA, were mixed and agitated with boiling water. A yellow solution was obtained, and a soft insoluble residue left. The aqueous solution was concentrated, and when cold precipitated with a

watery solution of tannic acid. The precipitate was collected on a filter, slightly washed with cold water, well mixed with recently precipitated plumbic carbonate, and the mixture evaporated to dryness. The dry powder was then boiled with absolute alcohol several times, the alcohol driven off on the water-bath, and the residue repeatedly agitated with chloroform and water. The chloroform solution was yellow and exhibited a well-marked greenish fluorescence; on evaporation 0·079 per cent. of a soft yellow extract was left, extremely bitter and easily soluble in alcohol, from which white microscopic needles in masses separated on slow evaporation. The mother liquor was of a bright yellow hue.

The amount of material was far too small to admit of any attempt at purification of these crystals from the yellow mother liquor with which they were contaminated. Judging, however, from the amount of crystallized matter separated, we are of opinion that it would probably weigh less than half the weight of the total chloroform extract.

In place of extracting the powdered wood with alcohol, in another experiment we boiled 70 grams five times with about 300 c.c. of water, pressing the marc well each time. The expressed liquids were mixed and concentrated on the water-bath to a bulk of about 50 c.c. To this turbid yellow fluid, when cold, aqueous tannic acid in slight excess was added, and then common salt in crystals, in amount more than sufficient to saturate the liquid. We added salt because we found that the tannin precipitate aggregated better, and was easier to filter. No attempt was made to wash the precipitate thus obtained; it was allowed to well drain on the filter, and then the filter paper with the contained precipitate was placed in a mortar, recently precipitated moist plumbic carbonate added, and the filter, precipitate and carbonate well rubbed together. The mortar was now placed on a water-bath, and when moisture had been expelled, the residue was reduced to powder. The powder was moistened with dilute alcohol, dried, placed in a flask and repeatedly boiled with 80 per cent. alcohol. The filtrates were evaporated to dryness, and the yellow residue mixed with water, and agitated three times with a large volume of chloroform. The chloroform solution was yellow, and possessed a marked greenish fluorescence, especially during the last extraction. On evaporation 0·156 per cent. of softish, dark yellow residue was left. This residue was easily soluble in alcohol with a greenish fluorescence; the taste was extremely bitter.

The filtrate from the tannic acid precipitate, as it possessed a slightly bitter taste, was acidulated with hydrochloric acid and agitated with chloroform. The chloroform extract amounted to 0·019 per cent.; it was soft, yellow, very bitter, and dissolved easily in cold absolute alcohol without fluorescence. On spontaneous evaporation, whitish particles separated, which when examined microscopically did not possess crystalline structure. This fraction was not further examined.

The chloroform extract obtained from the tannic acid precipitate amounting to 0·156 per cent., we attempted to purify in the following manner. We dissolved the extract in dilute caustic soda and agitated the alkaline solution repeatedly with chloroform. The chloroform extract amounted to 0·063 per cent. The extract was bitter, easily soluble in alcohol with greenish fluorescence. The alcoholic solution was allowed to evaporate spontaneously, and the residue in the capsule was then treated with cold ether, and the insoluble matter, which was of a yellow colour, collected on a filter. Dried at 100° C. the insoluble residue amounted to 0·021 per cent. This residue was yellow, brittle, and extremely bitter; it dissolved in alcohol with a yellow colour, and the solution on spontaneous evaporation left a yellow, varnish-like residue, destitute of crystalline structure.

The alkaline solution after separation of the chloroform was acidulated with acetic acid and agitated with chloroform. The chloroform extract was of a yellow colour, and amounted to 0·061 per cent. It was not easily soluble in alcohol, without fluorescence, and possessed an extremely bitter taste.

The ether used for treating the chloroform extract in the manner already described left on evaporation a yellow, extremely bitter residue. By treatment of the chloroform extract with an alkaline solution, and subsequent agitation with chloroform, it was thus divided into two fractions, the alkaline chloroform extract, and the acid chloroform extract; the alkaline chloroform extract, by subsequent treatment with cold ether, being separated into a portion soluble in ether and a portion insoluble in ether, which we take to be crude quassiin.

Our experiments indicate that the wood contains a crystallizable principle, probably quassiin, a fluorescing bitter resin-like principle, and at least one other non-crystallizable, bitter, resinous body, probably the uncrystallizable quassiin of Adrin and Morceaux. There are several points of interest connected with the examination of *P. quassioides* to which we would refer. Firstly, the wood is not so bitter to the taste as ordinary quassia wood. Secondly, the authors of the 'Pharmacographia' state that they obtained 7·8 per cent. of ash from quassia wood dried at 100° C.; the ash of *P. quassioides* obtained by us amounted to only 1·7 per cent. Thirdly, a watery solution of ordinary quassia wood is stated to display a slight fluorescence, especially if a little caustic lime has been added. According to Flückiger and Hanbury this is apparently due to quassiin. We have repeated the experiment with a sample of ordinary quassia wood, with negative results. The *P. quassioides* wood, when treated with water or alcohol, affords solutions which display a very marked greenish fluorescence. Regarding the content of quassiin, it appears to vary considerably. A. Christensen (*Archiv. der Pharm.*, [3], xx., 481) states that he found the amount to vary greatly, some specimens yielding scarcely any. Stillé and Maisch give the yield at 0·15 to 0·05 per cent. ('National Dispensatory'). The authors of the 'Pharmacographia,' at about 0·1 per cent. Messrs. Adrin and Morceaux (*Répert. der Pharm.*, xi., 246—50) obtained 0·125 to 0·15 per cent. of white crystalline quassiin. Oliveri and Denars (*Gazzetta Chim. Ital.*, xix., 1–9) obtained only 0·03 per cent. of the pure principle. While Goldschmiedt and Weidel in 1877 failed to isolate quassiin, they obtained a yellow resin, the presence of which had been previously noticed in the wood by Flückiger and Hanbury.

The amount of crystallizable principle present in the wood we examined, for reasons we have already

stated we are unable to accurately give. As a rough approximation we do not consider that it would amount to more than ·02 to ·03 per cent. as an outside limit.

Regarding the methods of analysis, extraction of the wood by alcohol, and subsequent boiling of the dry alcoholic extract with water, concentrating, and precipitating with tannin, appears to give better results, as far as a crystalline product is concerned, than the method we subsequently adopted.

Additional Note on Picrasma Quassioides.

BY W. DYMOCK AND C. J. H. WARDEN.

In order to ascertain whether any of the jaborandi alkaloids were present in the wood or not, we made the following experiments :—An alcoholic extract of the wood was digested with water, acidulated with 1 per cent. of hydrochloric acid, the solution filtered from insoluble resinous matter, and evaporated to a small bulk. When cold the deep yellow solution was precipitated with phosphomolybdic acid, filtered, and the precipitate washed with water containing a trace of hydrochloric acid. The precipitate was then treated with baryta water, the excess of barium removed by CO_2, and the liquid with precipitate evaporated to dryness. The residue was then boiled with 96 per cent. alcohol. On evaporating off the alcohol a non-crystalline varnish-like residue was left. This residue was bitter, partly soluble in water, and responded to the usual alkaloidal reagents. The amount obtained did not exceed a trace.

The method of extraction above described was subsequently modified in the following manner :—An alcoholic extract obtained from 263 grams of the wood was digested at a gentle heat for some hours with water acidulated with 2 per cent. of hydrochloric acid. The deep yellow solution was filtered, rendered alkaline with ammonia, and agitated with chloroform. The separated chloroform was then agitated with dilute hydrochloric acid, the acid liquid separated, made alkaline with ammonia, and again agitated with chloroform; and this operation was repeated a second time. Finally the chloroform was evaporated off, and left an amber-coloured, non-crystalline, transparent, varnish-like residue. In water this extract was only slightly soluble, but in water acidulated with a few drops of nitric acid it was wholly soluble, with the exception of a few flakes. On spontaneous evaporation of the nitric acid solution a yellowish non-crystalline residue was obtained, not easily soluble in cold 96 per cent. alcohol, slightly soluble in cold water, and not wholly soluble in warm water. An aqueous solution was of a deep yellow colour and possessed the following properties :—Taste distinctly pungent, very slightly bitter and acrid. With alkaloidal group reagents very marked precipitates were obtained ; with very dilute solutions, however, phosphomolybdic acid was one of the few reagents which afforded a reaction. Frohde's reagent gave no colour reaction in the cold or on heating.

The physiological action of the principle was tried by the following experiments :—A solution containing ·0009 gram of the principle injected hypodermically below the skin of a frog produced no symptoms. A solution containing about ·002 of a gram hypodermically injected below the skin of a cat's thigh yielded negative results. One of us swallowed a solution containing ·0036 of a gram without any symptoms whatever ensuing. A strong solution applied to a cat's eye caused no contraction of the pupil.

The amount of this principle separated from the wood, though we had operated on a fairly large amount, was insufficient for further experiments. Our experiments indicate, however, the presence of a distinctly alkaloidal principle in the wood, in addition to the principles to which we referred in our first note. As far as our experiments have gone there is no evidence to show that the alkaloidal principle is related to the jaborandi alkaloids.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 25.)

In referring to the pharmaceutical and fine chemicals in the Paris Exhibition, the first place is undoubtedly due to the Collective Exposition of French Pharmacists, a most interesting collection brought together especially to illustrate the discoveries the world owes to French pharmacists. The active agent in bringing this collection together has been M. André Ponthier, but he would appear to have received wide and ungrudging co-operation, for the catalogue contains a list of no less than fifty eminent French pharmacists who have contributed towards making it as perfect as possible. And it must be confessed that the display is one gratifying to national as well as professional pride. Referring only to the isolated active principles of plants among the substances shown as having had their chemical history worked out by French pharmacists, these are represented in the case by quinine, quinidine, cinchonine, strychnine, brucine, igasurine, emetine, narceine, narcotine, thebaine, solanine, sabadilline, veratrine, delphinine, anagyrine, colchicine, and coumarin. These substances are associated with such honoured names as Pelletier, Caventou, Magendie, Derosne, Robiquet, Guibourt, and Desfosses. Some similar substances that will occur to the mind as the discoveries of French pharmacists are not to be found in this case, apparently because they occur in other separate exhibits that will be mentioned subsequently. Among other interesting substances included in this display is some lævotartaric acid prepared from dextrotartaric acid by Jungfleisch, practically demonstrating that the differences between the varieties of tartaric acid are dependent upon physical conditions ; oxycinchonine and cinchoniline, two of the numerous derivatives recently obtained by the same chemist from cinchonine ; pterocarpin and homopterocarpin, the crystalline colouring matters obtained two years since from sandal-wood by Cazeneuve ; "chloralaniline," in sugar-brown crystals ; fine white crystals of phosphoglycerate of potassium, prepared by Jolly; a crystallization of anhydrous sulphuric acid ; and chirkestite and bidenguébinose, the two sugars obtained from the new varieties of manna that were the subject of a note in this Journal a few weeks since. Close by, and illustrating the remark made just previously, is another very interesting case, in which C. J. Tanret, of Paris, exhibits independently the compounds that have been discovered or introduced by himself. Here will be found the four volatile alkaloids isolated by him from pomegranate bark (*Pharm. Journ.*, [3], x., 829), one of which, pelletierine, has taken

a prominent place among tænifuges. Pelletierine sulphate is shown in fine white needles; pseudopelletierine, the only one of the four that is solid in the free state, and its phosphate, in fine white crystals; and isopelletierine and methylpelletierine as liquids. The ergotinine associated with Tanret's name appears, as shown, of a yellow colour, having become discoloured by exposure to light; it is also accompanied by ergosterin, the crystalline substance resembling cholesterin isolated from ergot by the same pharmacist a short time since (*Pharm. Journ.*, Feb. 2., p. 606). Besides these there are shown different substances isolated from the bitter orange peel, including aurantiamarin, the glucoside to which the bitterness is principally due, hesperidin and isohesperidin (*Pharm. Journ.*, [3], xvi., 924); also vincetoxin, the curious glucoside from *Asclepias Vincetoxicum* root, which has the property of gelatinizing when heated and liquefying again when cooled; and a fine preparation of inosite from walnut leaves. Nor must mention be omitted of the soluble double salts of caffeine which Tanret was the first to introduce, the cinnamate, salicylate and benzoate of sodium and caffeine all being shown. In the next case is another exhibit of great chemical interest, in the shape of a specimen of the alkaloid pilocarpine prepared synthetically by Hardy and Calmels in 1887, and proved to possess the same properties, physiological and chemical, as the alkaloid derived from jaborandi leaves (*Pharm. Journ.*, [3], xviii., 89). In this case also, which contains besides exhibits by F. Gallois and E. Delpech, may be seen anagyrine, the base isolated not long since from *Anagyris fœtida*, a "false senna," and some of its salts, as well as hydrochlorate of adonidine, and ammonio-mercuric peptone. For another good record of personal work it is necessary to go to the "colonial palace" in the Esplanade des Invalides, where among the Gold Coast exhibits will be found a number of substances representing the subjects and products of researches by Heckel and Schlagdenhauffen. Among others may be mentioned doundaké bark (*Sarcocephalus esculentus*, Afz.), a rubiaceous febrifuge from which they separated two nitrogenous principles and a beautiful yellow pigment, thought worthy the attention of dyers; the kola nut (*Sterculia acuminata*), from which they obtained caffeine and theobromine; and two "false kolas" (*Garcinia Kola* and *Heritiera littoralis*). Still another instance of the kind is the case of C. Verne, of Grenoble, in which are shown in addition to boldo leaves and preparations, boldine, the alkaloid separated by him from the drug, together with several of its salts.

There are several fine general displays of pharmaceutical chemicals, which are especially notable for the beautiful appearance imparted by the brilliancy of the crystalline compounds. In the case of E. A. Petit, of Paris, the visitor has the opportunity of seeing together most of the chemical compounds that have been introduced recently into medicine. In a prominent place stands a good sample of "exalgine," or methylacetanilid, the compound so strongly recommended recently by Drs. Dujardin-Beaumetz and Bardet as an anodyne. It is only fair, however, to say that the most striking exhibit of exalgine is to be found among the fine show of tar products in the case of Brigonnet and Naville, where there is a quantity of it in needles two inches long, and also a mass not quite so definitely crystallized. A similar remark applies to antipyrin, which will be found in large crystalline masses in the case of the Compagnie Parisienne de Couleurs d'Aniline. Associated with exalgine in M. Petit's case are analgésine, the French representative of antipyrin, sulphonal, acetylphenylhydrazin or hydracetin, methacetin, benzanilid, and ethoxycaffeine. There is also a specimen of synthetically prepared cocaine, together with benzoylecgonine. A fine sample of eserine, or as it is perhaps more frequently called in this country, physostigmine, is accompanied by some salicylate of eserine, the salt that is official in the United States and German Pharmacopœias, and by the red and blue colouring matters associated with the alkaloid, the nature of which the exhibitor helped to explain. Another good display is that of Adrian and Co., of Paris, which includes two large glass bottles of atropine and sulphate of atropine, prepared by M. Moriaux; eserine nearly, but not quite colourless; sulphate of sparteine; fine crystallizations of aconitine and digitalin; quassiin crystallized and amorphous, and a dishful of lustrous red brown crystals of hæmaglobine. Under the name of Duquesnel and Millot, the former of whom will be remembered for his work on crystallized aconitine, are shown a number of similar substances, including digitalin, "light" and "heavy" atropine, salicylate of atropine, hyoscyamine, sulphate and salicylate of eserine, columbine, picrotoxin and helenin. Crystallized strophanthin of great merit and in quantity will be found in the case of A. H. Catillon, of Paris, where it is accompanied by specimens of the seeds of *Strophanthus hispidus*, *S. Kombé* and *S. glabrus*, the root of *S. hispidus*, and by dark green and pale yellowish green oil derived from the seeds. The Société du Traitement des Quinquinas (A. de Lisle) makes a very good display of the cinchona alkaloids and their salts, among which are some rather unusual compounds, such as quinine saccharinate, malate, camphorate, succinate, formate, arseniate, picrate and a crystalline nitrate. Another good display of cinchona alkaloids is that of E. L. Viennot, of Ivry-Port, where are to be found compounds that are called respectively "soluble quinine chlorhydrate for hypodermic injections," "quinine bichlorhydrate," "quinine bibromhydrate," and "basic quinine bromhydrate." Cinchona alkaloids are also exhibited by L. A. Taillandier, of Argenteuil. One case, that of G. de Laire and Co., of Paris, is somewhat pleasantly aggressive in its attack on the olfactory organs, its contents consisting of artificial vanillin, cinnamic acid, anisic acid and a number of aromatic alcohols, aldehydes, ethers and acids, many of them intended for use in confectionery and perfumery. Carbolic acid, or as our French neighbours prefer to call it phenic acid, and its compounds, occupy the case of G. Déclat, of Paris, where may be seen phenic acid of good colour in fine crystals, the phenates of caffeine, cocaine and quinine, sulphophenic acid and a number of sulphophenates, together with compounds of phenol with resorcin, chloral and camphor, the last two being liquids. Another exhibit of an allied character is that of the Compagnie Générale des Produits Antiseptiques, of Paris, which consists mainly of salicylic acid and its compounds. Here are to be seen salol, salicylic acid

and the salicylates of sodium, lithium, bismuth and quinine. In addition there are some fine crystals of potassium chlorate, described as having been prepared by electrolysis, and liquid carbonic acid. Lithium salicylate and benzoate are also exhibited by H. Mourrut and Co., of Saint Ouen, as well as the salicylates of bismuth, lead, sodium, mercury, arsenicum and cadmium, the last in white glistering scales. H. Fournier and Co., of Paris, exhibit a number of chloral compounds, among which are "ethylate of chloral," or chloral alcoholate, having the appearance of a downy mass of acicular crystals; a fine crystallization of chloral hydrate, the effect of the crystals being increased by their being placed vertically; and some "chloral-antipyrin" in crystals. There is also in this case a bowl, the bottom of which is covered with a fine crystallization of quinine hydrochlorate. But this part of the subject should not be closed without calling attention to the exhibit of Crudenaire and Chanut, of Paris, in whose case will be found several compounds which are better known in French than in British pharmacy. Among these may be mentioned lactophosphate and chlorhydrophosphate of lime, used in phosphate preparations; sodium sulphovinate, which has some reputation as a mild purgative; "soluble" cream of tartar; citro-ammoniacal pyrophosphate of iron, in large bottle-green scales; and some other allied preparations. There is also a fine specimen of metaphosphoric acid, in appearance like pieces of clear plate glass, and another similar one of metaphosphate of soda. Enough has however been said to show that French pharmacists are well abreast of the times in this part of their business and are not open to the reproach of being dependent upon Germany, or any other country, for a supply of the definite organic chemical compounds that are now so widely and increasingly ordered by medical men in the treatment of disease.

In adding a few lines about the fine chemicals not so closely associated with pharmacy, reference must be made especially to the magnificent display by E. A. Billault, of Paris, which has probably been unequalled since the exhibit by the same firm in 1878. The beautiful play of colours in the platinocyanides, platinochlorides and other coloured compounds has again been utilized in an extremely artistic manner, so as to make the case one of the most attractive, even to the ordinary visitor, in this part of the exhibition, and not only are the specimens remarkable for their evident quality, but for the quantity shown in almost every instance. There is the platinocyanide of magnesium in cubes that are violet-red by transmitted light, with a shimmer of green on the sides on which the light falls. The platinocyanide of lithium and potassium occurs in long orange-red prisms, having a violet tinge; that of potassium and sodium in bright orange crystals with a pink and blue reflection; whilst the barium compound is in crystals that appear green when looked at in one direction, and yellow in another. Then there is a dish of tungstate of tungsten and sodium in orange granules, and another of the corresponding potassium salt in crystals of a garnet colour. Almost all the lithium salts are represented, among those noticed being the acetate, tartrate, citrate, sulphate, ferricyanide, ferrocyanide, nitroprussiate, binoxalate, carbonate, hippurate, chloride and bromide. Rubidium and several of its salts are also shown; osmium, osmic acid, osmide of iridium in steel-coloured granules, glucinum carbonate, selenium and selenious acid, ruthenium, calcium, and other of the rarer metals. Effective use is also made of some magnificent crystals of erythrite and the peacock iridescence of crystallized bismuth. Another case worthy of mention is that of Poulenc Brothers, of Paris, in which there is a good display of cobalt salts; a specimen of nitrate of uranium in lemon-yellow fluorescent prisms; isatin in red prismatic crystals, and a pretty crystallization of bismuth.

(*To be continued.*)

PROPRIETARY VERSUS LEGITIMATE PHARMACY FROM A MEDICAL POINT OF VIEW.*

BY WELLINGTON ADAMS, M.D.

Along with the many beneficial effects an increased liberty of thought and action has enabled us to enjoy, there have grown up abuses that require serious attention. When greater opportunities have been afforded for enlightened discussion and development of opinion, in like measure has been the freedom extended to malice, charlatanism and peculation. With improved intercommunication and increased national wealth, the opportunities for ill-doing have been proportionately augmented; as communities have widened, and attainable knowledge of our neighbour's character diminished, the chances for speculation, swindling and traducing have increased.

A century since, the people were divided, with few exceptions, into small communities, where the position and character of every citizen was well known; now, however, we are compelled to rely almost entirely upon our newspapers and journals for such information. Not only are we so dependent upon them, but the majority are led by their representations (through advertisements and notices) to place trust in schemes of which they otherwise have no knowledge. It therefore devolves upon editors of lay, trade and professional journals to exercise a careful surveillance over all that appears under their authority. In arrogating to themselves the functions of educators and reformers, they should be quite sure that their pretensions bear no unfortunate disproportion to their actions; and as abuses naturally arise in this as in all other departments of every-day life, the law should, when possible, afford ample and thorough redress, and not leave too much to the "editorial conscience." There are three principal classes of these proprietary medicines:—

I. Those secret compounds, familiarly known as "patent medicines," which seek the patronage of the public alone, and are advertised directly to the public without disguise, and dispensed alone for self-treatment; each package being accompanied by full directions for use, and a long list of symptoms common to numberless affections, which, when glanced at by the imaginative, the ignorant and the foolish, are almost certain to impress nine hundred and ninety-nine people out of every thousand such, that they are subject to one or more of them. Examples of this class of proprietary medicines are "Warner's Safe Cure," "Pierce's Golden Medical Discovery," "Ayer's Cherry Pectoral," etc. These are quack medicines *undisguised*, and the ordinary physician requires no caution with respect to them, although we are aware of a case where a so-called physician, not many miles from here, makes a habit of prescribing "Pierce's Golden Medical Discovery;" but such men are without the pale of the legitimate profession, and such cases are not worthy of our serious thought.

* From the 'Kansas City Medical Index.' Reprinted from the *Western Druggist*, June.

II. Proprietary pharmaceutical specialties, as compounds of old and well-known drugs, claiming to be new discoveries in pharmaceutical science in regard to some alleged peculiarity in their method of manufacturing, the true or working formulas of which are usually trade secrets, and the names of which are claimed as trademarks by their manufacturers, who depend upon physicians' prescriptions for their patronage. Proprietary medicines of this class are usually provided with labels containing information for self-treatment, consisting of what pretends to be full directions for use, and a list of the affections for which the medicine is intended.

The physician who prescribes this second class of proprietary compounds not only gives countenance and support to a system which is fundamentally opposed to legitimate pharmaceutical and medical progress, but he also inflicts injury upon himself and his hard-working, self-sacrificing professional brethren, who work conscientiously day and night in preparing themselves to alleviate human suffering in every phase and emergency, making it difficult for them to eke out a bare subsistence, while the proprietor of the compound, so advertised by the doctor, revels in untold wealth, and laughs at the credulity of physicians.

III. The third class of proprietary medicines comprises those simple new drugs whose arbitrarily selected names are controlled by a patent or a trademark, as well as those articles which, under a peculiar form of dispensing, receive arbitrary names which are either patented or trade-marked; both of which at first address themselves exclusively to the medical profession, but subsequently fall into class two and are thoroughly advertised to the public, after the unsuspecting physician has thoroughly endorsed and brought them before the public for the ultimate benefit of the proprietor and manufacturer. Examples of this class are: Ingluvin, antifebrin, antipyrin, salol, soziodol, urethan, sulphonal, svapnia, pancrobilin, compressed tablets of muriate of ammonia, tabloids, valoids, elixoids, pilloids, parvules, alkatrits, alkametric granules, alkadermic pellets, alkassayed fluids, and so on *ad nauseam*.

The whole system of protected medicines, involving an individual proprietorship, and including the three classes mentioned, creates pernicious monopolies which permit the proprietor or manufacturer to charge an exorbitant price, far beyond a legitimate profit, and thereby unfairly obtain immense fortunes out of the ills of humanity. Not content with the protection afforded by patenting and copyrighting labels and names, these patented and proprietary medicine fiends now come before the public in a new role, having developed a new scheme for prosecuting their nefarious business, consisting of patenting the process and the apparatus by which these various drugs are manufactured. Surely this is the time to call a halt, for it must be conceded that, in very many cases, the new chemical products possess real merit; as, for instance, in the case of salol, antipyrin, sulphonal, etc., where the physician finds their use advantageous, but finds himself confronted with the evil principle of a protected proprietorship with its consequent monopoly. The manufacturer in such cases generally deserves but little credit, if any, since some scientist has previously invented the process, having made a limited amount of the drug and published the results, only to find himself subsequently prevented from using the drug without paying an enormous tribute to the manufacturer.

Should the inventor prove unscrupulous and unethical, then he will combine with the manufacturer and share in its profits, in which case, of course, the inventor will do all in his power to advance the sale of the product by writing articles over his name and scientific title, which, because of his professional standing, will be received by the current medical and pharmaceutical literature of the world; thus opening a dangerous avenue for misrepresentation and unwarranted claims. Under the name "acetanilid," which has been adopted by the profession of this country for the protected article known as antifebrin, we may purchase the drug from whomsoever we choose at a reasonable price; while under the latter or protected name we must pay a greatly advanced price.

We can perhaps imagine in what position we shall soon find ourselves if this system is persisted in, by considering in what position we would now be placed if this system had been discovered and adopted at an earlier date in the history of medicine. For instance, suppose the name "pepsin," when it first came out, had been trademarked, and the process and apparatus patented. The product would, in all probability, be as poor to-day as when first adopted by the Pharmacopœia, having a digestive strength of but 1·50; for in that event no one could, except by an entirely different process, produce pepsin without infringing upon certain parts of the process adopted, for instance, by Scheffer. So that under such conditions no one would have exerted himself to place upon the market a pepsin superior to that of Scheffer. But since the name pepsin and the process and apparatus for manufacturing it were not patented, free competition has enabled leading scientific manufacturers to investigate and bring upon the market a number of varying grades of pepsin of superior strength, the last of which has reached the strength of 1200. It is, therefore, obvious from this single example, that monopoly in any chemical product throttles competition and consequent improvement in the product, leaving both science and humanity to suffer thereby. In other and older countries this abuse of the patent and trademark system is not allowed. In France, for instance, antipyrin cannot be trademarked, or its processes and apparatus for manufacturing patented. Every French manufacturer, therefore, is at liberty to make and sell antipyrin under that name. A legitimate trademark, however, is allowed for the product manufactured by the inventor or by anybody else, under their respective names; as, for instance, "Antipyrin Knorr." If the physician believes that the antipyrin manufactured by Knorr is superior to that made by others, he is, therefore, at liberty to prescribe "Antipyrin Knorr," and this product must be supplied. Under the names "Antipyrin Merck," "Antipyrin Gehe and Co," etc., these respective manufacturers are entitled to the protection afforded by this character of trademark. Thus "Pepsin Boudault" is likewise a legitimate trademark allowed in France, so that if this article is prescribed the product manufactured by Boudault or supplied by his agents must be furnished. But in this case also any person or firm has the right to improve the process for the manufacture of pepsin, and to place on the market a product superior to Boudault's pepsin, should it be found possible to prepare one, with the legitimate protection afforded by the title, for instance, of "Pepsin Jensen," "Pepsin Fairchild," "Pepsin P. D. and Co.," as the case may be.

Should this scheme continue, there is no telling what the future may bring forth. We may at least rest assured that all progress will be seriously hampered, mischievous monopolies will be created, and the name for every new article will be protected by trademark, the process and apparatus for preparing the article will be patented, and the physician's therapeutical armamentarium will be needlessly glutted with trademark names. Suppose manufacturers had availed themselves of this method before, what an immense advantage and monopoly the first manufacturer of cocaine would have had; again, fancy the dastardly injury to humanity the discoverer of quinine would have had the power to inflict.

The Pharmaceutical Journal

SATURDAY, JULY 20, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

AMERICAN PHARMACEUTICAL ASSOCIATION.

ATTENDANCE at a pharmaceutical meeting involving a journey of some four thousand miles is an undertaking that would probably astonish the average Britisher, but with our transatlantic cousins, who are more accustomed to big things, the case is different, and within the last few weeks this feat has actually been performed by no small number of them. The meeting of the American Pharmaceutical Association at San Francisco, opened on the 24th of last month with an attendance of about one hundred members, gathered together from all parts of the United States. After the usual inaugural formalities, the President, Mr. M. W. ALEXANDER, of St. Louis, delivered his address, in which he briefly referred to the rapid increase of members and to the fact that the annual expenses were becoming greater than the receipts. The suggestion that has been made to exclude from membership of the Association all who are not for the time being engaged in retail pharmacy was condemned as suicidal, and the opinion was expressed that it would be better to welcome all —whether wholesale druggists, manufacturing pharmacists, or teachers in colleges—as workers in one common field. The official representation of the Association in the seventh decennial revision of the national Pharmacopœia was naturally alluded to as being the first time it has enjoyed that right, and it was held that the importance of this step should not be lightly regarded. A hope was also expressed that the metrical system would now be fully adopted and that the system of parts by weight would be retained. Finally reference was made to the approaching meeting of the American Medical Association at Newport, and the proposed establishment in that body of a section on pharmacy, and it was stated that Professor REMINGTON was then on his way to attend that meeting as the accredited delegate of the American Pharmaceutical Association. In accordance with the usual custom the presidential address was referred to a committee to consider and report upon its recommendations. This seems a useful arrangement for giving vitality to suggestions in such addresses, which might otherwise be forgotten or fail to be carried into effect. Notwithstanding the increased expenditure mentioned by the President, the present financial position of the Association appears to be satisfactory, for according to the Treasurer's report the balance in hand amounts to about six hundred pounds.

The papers read at the several sittings of the Association were, judging from their titles, of fair pharmaceutical interest. Professor REMINGTON discussed compound galenical preparations and the propriety of retaining them in the Pharmacopœia. The conclusion arrived at by him is that all which have established their usefulness should be retained, but that all others should be dropped out. In a paper by Professor J. U. LLOYD on the "Effect of Moisture as a Preparation in the Extraction of Drugs," it was recommended to use enough water to soften plant integuments, and to spray the water on the powdered drug so as to avoid lumping; then to allow the water-moistened powder to stand for a considerable time in a closed vessel, and when possible to sprinkle it with alcohol, before packing in the percolator, so as to bring the liquid in it to the composition of the menstruum to be used in percolating. One of the advantages claimed for this mode of proceeding is that a coarsely-powdered drug may thus be extracted more easily than by the usual method of operating. In a paper by Professor GALLOWAY, the effects produced by arsenic in wall papers were described as constituting a grave evil in regard to public health and one that was constantly on the increase. Dr. OLDBERG, in a paper on "Pharmacopœial Nomenclature," recommended that no name should be used that does violence to established knowledge or perpetuates error; that each name should be clear and descriptive as far as consistent with necessary brevity; and that no name should be used which is capable of essentially different interpretations, or which has been, or is applied to more than one thing. Professor C. S. HALBERG, of Chicago, read a paper on "Wool Fat," in which he showed that it had been in use at the time of Herodotus, as it is now, combined with water. In a paper on "Glucose Syrup," by F. A. ROMETESCH, the author contended that this syrup should not be used at all. Professor EBERT disputed this opinion, maintaining that glucose syrup containing a certain amount of cane sugar is the best that can be used for soda water fountain purposes, and for several other uses in pharmacy. The relative value of pepsin tests was treated of by F. A. THOMPSON in a paper that led to a sharp debate. Professor HALBERG declared that it was nothing but an advertising dodge for a "patent medicine," and EBERT stated that a packing house in Chicago furnished nearly all the pepsin put into the market by the various rival makers. In Professor J. U. LLOYD's paper on "Maize Oil" it was claimed

that this oil can be used in pharmacy, and that it has many advantages over cotton-seed oil or the other oils now in use. In liniments much less separation takes place when maize oil is used than is commonly the case with other oils. G. W. KENNEDY, in another paper on the same subject, took a similar view. A. B. ROCKWELL, of Ann Arbor, read a paper giving much information respecting the Pichi tree, of Ecuador, with some hints as to the pharmaceutical preparation and uses of its products. S. A. MCDONALD, of San Francisco, read a paper on the alcoholic extract of cod liver oil—morrhuol—which is proposed for use as a substitute for the oil itself. In addition to these, several other papers were read, of which we must defer further mention until they can be published in full.

At the meeting of the American Pharmaceutical Association it is customary to discuss subjects of a more political character than those above mentioned, and at the late meeting there was frequent opportunity for doing so. In the Section on Pharmaceutical Education Professor BEDFORD, the Chairman, delivered an address on this subject, sketching the growth of the educational system in America from the time when there was but one college of pharmacy, now sixty-nine years ago, down to the present time, when there are a dozen schools and a score of colleges. He stated among other things that there are 38,000 drug stores in America, employing 75,000 persons in handling, selling and dispensing medicines. He suggested as topics for consideration and future discussion the queries, What is the duty of the fraternity towards the pharmaceutical educational institutions? What suggestions can be advanced to better the methods of teaching now followed? What can be done to secure greater interest in and larger classes for educational advantages? The report of the Committee on Preliminary Examinations gave rise to an animated discussion, and it was referred to a committee for publication. Several papers on educational subjects were read in this section. In the section on commercial interests the subject of the liquor trade was discussed with considerable animation and much difference of opinion. The rebate plan next came under consideration with much the same result. Messrs. PAINTER, of New York, and KILMER, of New Jersey, objected to the system as prejudicial to the retailer, while Mr. J. VERNOR, of Detroit, considered that it might be a necessary evil, since the proprietary remedies, with which it was originated and is connected, constitute over forty per cent. of all the goods sold by pharmacists in the States. The matter was finally referred to a special committee to report upon. The question of interchange of certificates by boards of pharmacy was also discussed and referred to the Legislative Committee. At the afternoon sitting of this section, however, the care for commercial interests had been so far extinguished by the attraction of various entertainments, that a messenger had to be dispatched to head-quarters for a reinforcement of members to make a meeting, and eventually the section had to be adjourned. The various arrangements for entertaining the visitors appear to have been numerous and well managed. During the session there was an exhibition of pharmaceutical preparations, drugs, etc., which is described as having been a decided success, notwithstanding the distance and the cost of transport. The exhibit of Messrs. PARKE, DAVIS and Co., is especially mentioned as having been the finest display of its kind ever seen in the country. The place of meeting decided upon for next year was the town of Old Point Comfort, Va., and Professor EMLEN PAINTER, of New York, was elected President.

The meeting of the German Apotheker-Verein, which had originally been arranged to take place in Wurzburg, has now been transferred to Mayence, and it will be opened on the 8th of September with a social gathering and an exhibition of objects of pharmaceutical interest. The following four days will be devoted in the mornings to sittings of the Council and general meetings of the members. On Monday evening a concert will be given in the Stadthalle, or in the adjoining gardens, according to the state of the weather. On Tuesday afternoon arrangements have been made for a visit to the "Kupferberg" Sektkellerei, where the local production of effervescing wine will be inspected, and in the evening a concert will be given with fireworks in the new town gardens. The dinner of the members will take place on Wednesday at the Stadthalle, and on Thursday an excursion by steamer will be made to Rudesheim and Bingen, affording opportunity for visiting some places of interest in the neighbourhood.

* * *

The Dublin correspondent of the *Lancet* states that the Council of the Royal College of Surgeons has adopted a resolution in reference to pharmacy certificates for the first professional examination of the conjoint scheme of the College of Physicians and Surgeons to the effect that after October the College will not accept any pharmacy certificate unless taken out at a hospital or medical school. It is remarked that this resolution strikes at the pharmaceutical chemists, who may be said to prepare at least three-fourths of the students taking out the certificate, and that as no complaints have been heard of the way their pupils are prepared, it appears a hardship to cancel a regulation that worked fairly. The *Medical Press and Circular*, on the contrary, states that the regulation has been largely taken advantage of by certificate mongers, who supply certificates for a nominal fee and without any real study. It is represented that a certificate of three months' study of pharmacy could be had at ten minutes' notice from certain well known traders for 10*s*, and that the colleges have been obliged to take means to prevent evasion of the regulations in this way. Of course, it will be understood that this applies to Ireland.

Transactions of the Pharmaceutical Society.

EXAMINATION PAPERS.

SCHOOL OF PHARMACY.

The following are the questions that were set at the recent Sessional Examinations in the Society's School of Pharmacy:—

CLASS OF PRACTICAL CHEMISTRY.

PROFESSOR ATTFIELD.

SESSIONAL EXAMINATION FOR A SILVER MEDAL AND THREE CERTIFICATES OF HONOUR.

Hours: *Half-past* 10 *to* 5. *July* 9.

Books and Memoranda permitted.

Standard number of Marks, 100.

1. What percentage of citric acid is present in the accompanying sample of "Lime Juice?"

2. How much real acid is present in one fluid ounce of the "Hydrocyanic Acid" supplied to you?

3. What proportion of free sulphur is present in the "Milk of Sulphur" placed before you?

NOTE.—*Manipulation as well as results will be scrutinized.*

CHEMISTRY AND PHYSICS.

PROFESSOR DUNSTAN.

SESSIONAL EXAMINATION FOR A SILVER MEDAL AND THREE CERTIFICATES OF HONOUR.

Part I.—Physics.

Time allowed: 10 *a.m. to* 1 *p.m. July* 12.

1. Give an account of the British and Metric Standards of Weight. How are these standards connected with each other?

2. Describe the principle on which is founded the Victor Meyer method of determining vapour densities. Make a sketch of the apparatus which is employed. Describe minutely how you would determine the vapour density of quinoline by this means, including the necessary corrections and calculations.

3. What is the law of the Conservation of Energy? By what experiments has the correctness of this law been demonstrated?

How do freezing mixtures act, and how may the low temperatures produced by them be recorded?

5. Explain the construction and mode of action of "primary" and "secondary" batteries.

6. Write a short account of the emission or corpuscular theory of light, and compare it with the undulatory theory which is now accepted.

Part II.—Chemistry.

Time allowed: 2 p.m. to 5 p.m. July 12.

1. Write a short account of the Periodic Law and show how it may be employed to control the accuracy of atomic weights.

2. Describe the methods of preparation and properties of the compounds designated by the formulæ NH_3, N_2H_4, NH_3O.

3. Describe the preparation, and contrast the properties of the elements phosphorus, arsenic and antimony.

4. Describe the methods of preparation, reactions and constitution of Lactic Acid.

5. Exhibit the points of similarity and difference between the varieties of alkyl hydroxides known respectively as "alcohols" and "phenols."

6. State the chief characteristics of the vegetable alkaloids. Write a short summary of Ladenburg's researches on the constitution of conine.

BOTANY.

PROFESSOR GREEN.

SESSIONAL EXAMINATION FOR A SILVER MEDAL AND THREE CERTIFICATES OF HONOUR.

Hours from 11 *till* 2. *Wednesday, July* 10.

1. Describe the structure of a typical root of a flowering plant and give an account of its functions. What modifications of such structure are most common. Explain the reasons for such modifications as you describe.

2. Explain the appearance of starch in plants. Describe the structure of starch grain, and show how these bodies are formed in parts of plants not exposed to light.

3. What is a "natural order?" Give some account of the natural order Rosaceæ. Mention its nearest allies and show how you would discriminate between them.

4. Describe the prothallium of a fern.

Hours from 3 *till* 6. *Wednesday, July* 10.

1. Give some account of the more commonly occurring movements that may be observed in different parts of plants. How are such movements brought about in parts that have ceased to grow.

2. Describe the chief modifications of the ground tissue of plants, pointing out where each one you describe may be met with.

3. Give an account of the structure and life history of *Volvox globator*.

4. What are the characteristics of the sub-class Thalamifloræ? Enumerate the chief natural orders of the British Flora comprised in this sub-class and mention their distinguishing features.

PRACTICAL BOTANY.

Hours from 11 *till* 2. *Saturday, July* 13.

1. Make such microscopic preparations as you think necessary to display the structure of the specimen A. Mount them in glycerine.

2. Sketch your preparations and point out in your sketches the points which you consider important.

3. Describe in botanical language the specimen B. Draw its floral diagram and refer it to its natural order.

4. Refer the flowers given you to their several natural orders.

MATERIA MEDICA.

MR. HOLMES.

SESSIONAL EXAMINATION FOR A SILVER MEDAL.

Hours from 11 *till* 1. *Thursday, July* 11.

1. Examine under the microscope the portion of leaf placed before you, and state from what medicinal plant it is derived.

2. Examine the powder placed before you, under the microscope, and give your opinion as to its constituent or constituents and their purity.

3. Name the articles of Materia Medica placed before you and mention the physical characters by which you recognize them.

4. How would you ascertain the quality of a commercial specimen of opium?

Hours from 2 *till* 5. *Thursday, July* 11.

1. Mention the varieties of the following drugs met with in English commerce, and point out the differences by which they may be recognized: Anise, Caraway, Dill, Henbane, Jaborandi, Liquorice Root and Senna.

2. From what plants are Menthol, Safrol and Thymol respectively obtained? Can either of them be prepared artificially?

3. To what natural orders of plants do the following articles of materia medica belong: Iceland moss, Irish moss, Boldo, Hop and Storax.

4. Mention the impurities liable to be met with in

powdered scammony and the means you would employ to detect them.

5. What is the botanical source of Pareira Brava? Whence is the drug imported, and what is known of its active principle?

6. What are oak galls? Mention their active constituents, and the physical characteristics of galls of good quality.

PHARMACY AND PRACTICAL PHARMACY.

MR. INCE.

SESSIONAL EXAMINATION FOR A SILVER MEDAL.

Time allowed—11 *a.m. to* 2 *p.m. Monday, July* 8.

1. Enumerate and comment on, the official preparations in which ether is employed.

2. Describe modern improvements in filtration, and discuss the question as to the use and misuse of the process generally.

3. Give in detail the pharmaceutical applications of Oleum Terebinthinæ and the methods by which it may be dispensed.

4. Classify the Unguenta of the British Pharmacopœia. (a) according to their bases. (b) according to their chemical composition. Note special modes of preparation.

Proceedings of Societies in London.

ROYAL COLLEGE OF PHYSICIANS.

[CROONIAN LECTURE.]

RELATION BETWEEN CHEMICAL STRUCTURE AND PHYSIOLOGICAL ACTION.

BY T. LAUDER BRUNTON, M.D., F.R.S.

(*Continued from page* 39.)

We now pass from the prevention of diseases to another subdivision of our subject, viz., their control and cure. Antiseptics find their most important application in the prevention of disease. But many bodies belonging to this class have other actions which are extremely valuable in relation to the control and cure of disease. More especially is this true of their power to reduce temperature and relieve pain. We might therefore pass from antiseptics straight on to antipyretics. Or we might take another course, and on leaving antisepsis, one of the two greatest discoveries of modern therapeutics, we might turn to the other, viz., anæsthesia, and proceed to the consideration of anæsthetics. Both plans have advantages of their own. If we take anæsthetics first, it allows us to a certain extent to follow the subject of the relation between chemical structure and physiological action historically, and it has the further advantage of allowing us to begin with bodies of simple chemical structure and to proceed from them to the more complex. Such an arrangement would undoubtedly be best in a text-book, but as my object here is not to give you a full account of all that is known in relation to the connection between chemical structure and physiological action, but rather to point out its relations to the treatment and cure of disease, I shall take the other method and pass from antiseptics directly to antipyretics. There is a natural link between those two classes of remedies. Not only are antiseptic and antipyretic properties generally possessed by the same substances, but we use the same remedies to destroy microbes both outside and inside the body, and also to reduce the fever which the microbes cause after their entrance into the organism.

Besides this, a number of new facts have been ascertained regarding the functions of protoplasm by the use of bodies belonging to the aromatic series. I wish particularly to call your attention to those facts because they may help us to explain the action of other classes of drugs as well as that of antipyretics.

MOVEMENTS OF CELLS.

On observing isolated cells, such as the leucocytes of the blood, we can see that they are endowed with life, and will continue to move about on the stage of the microscope as independent organisms for a considerable time after the death of the animal from which they have been taken. Their movements are of two kinds, viz., one of simple contraction or extension of the protoplasm in various directions, while the cell remains in its place, and secondly, movements from place to place. I call your attention specially to those kinds of movement because both are probably of practical importance. The movements from place to place enable the leucocytes, as was first observed by Addison and then by Walter, to move out of the blood-vessels. The importance of this diapedesis and of the further movements of the leucocyte amongst the cells of the tissues has been clearly demonstrated by Cohnheim and his followers; but it seems probable that movement of the protoplasm in a cell while it remains *in situ* may be no less important.

RESPIRATION IN CELLS.

Kühne showed that isolated cells have the power of absorbing oxygen, by placing them under the microscope in water containing a little oxy-hæmoglobin. After a while they absorbed the oxygen from the hæmoglobin and reduced it. The reduction was discovered by looking at the solution with the microspectroscope, and noticing that it gave the band of reduced hæmoglobin instead of oxy-hæmoglobin as at first. The experiments of Ludwig and his scholars upon circulation through single organs or parts of the body isolated from the rest, and also those of Pflüger and his school upon the gases of the blood, have shown that oxidation and reduction occur in the tissues, but the amount of each is not always the same, oxidation being sometimes predominant, and, at other times, reduction. Similar results have been obtained in living men by Pettenkofer and Voit. It was found by Harley that the absorption of oxygen and the elimination of carbonic acid by blood could be altered by admixture with various poisons. The power of quinine to lessen such processes was not only discovered by Binz, but brought by him into close relationship with the antipyretic power of the drug, and his researches formed a starting point for numerous investigations into the action of antipyretics generally.

In the admirable lectures which he gave before this college last year, Dr. MacAlister gave such a complete account of the pathology of fever that I need not do more here than just recapitulate one or two of his chief conclusions.

Increased temperature may depend upon (*a*) lessened loss of heat by radiation or conduction, or (*b*) increased formation of heat by greater oxidation in the tissues, and especially in the glands and muscles. The oxidation by which heat is formed in these tissues is regulated by two or three nerve centres within the cranium. Antipyretics, he informed us, appear to lessen oxidation within the body and diminish the formation of heat by stimulating these centres, but he did not discuss the mode in which stimulation of the thermal centres alters the processes of respiration in the tissues and thus lessens oxidation. This point of the question I propose to take up now, but before I can deal with the action of drugs as antipyretics I must ask your attention for a short time to some observations which have been made upon the respiratory functions of the cell.

OXIDATION AND REDUCTION.

For such experiments as those I have already mentioned, it has been known for some time that cells

possess the power of taking oxygen from the air, from liquids containing it in solution, or from substances like hæmoglobin, which contain it in a loose state of combination. To this power of removing oxygen from other things the term "reducing" is given, while that of "oxidizing" is applied to the power of giving off oxygen to other substances.

Double Action of Hæmoglobin.—Some bodies, like hæmoglobin, possess both powers to a large extent. A solution of hæmoglobin mixed with air absorbs the oxygen from it, and thus has a reducing action, but if this oxidized hæmoglobin be then mixed with some ferrous sulphate it gives up the oxygen to it, oxidizes it, and forms ferric sulphate. It thus loses its oxygen and becomes reduced, the ferrous sulphate having acted upon it as a reducing agent.

Comparative Degrees of Affinity for Oxygen.—Substances differ in the degree of affinity which they have for oxygen, it being greater in some and less in others. Thus it happens that we might draw up a scale containing a number of bodies, each of which would have a greater affinity for oxygen than the one above and less than the one below it. Each one would therefore abstract oxygen from the one above it, and act as a reducing agent towards it, while it would give up oxygen to the one below it, and thus act as an oxidizing agent.

EFFECTS OF REACTION AND ELECTRICITY ON OXIDATION AND REDUCTION.

Effect of Acid or Alkaline Reaction.—The degree of affinity for oxygen which many bodies possess is greatly altered by the reaction of the fluid in which they are dissolved, so that one which would have a powerful reducing action in an alkaline solution has none at all when it is acidulated.

Effect of Electric Currents.—Moreover electric currents may originate processes of reduction or oxidation. Thus, if an electric current be passed through water, decomposition occurs, the hydrogen being liberated at the negative pole, and oxygen at the positive. If the electrodes are made, as they usually are, of a substance like platinum with which the oxygen or hydrogen cannot combine, these gases are simply given off, but if the positive electrode is made of an oxidizable, and the negative one of a reducible substance, the oxygen and hydrogen will act upon them and they will undergo reduction or oxidation accordingly. By reversing the current, changes of the opposite nature will occur, oxidation giving place to reduction and *vice versâ*.

Formation of Urea.—By means of alternating currents of this sort, Drechsel has succeeded in converting carbonate of ammonia into urea and has rendered it probable that alternate oxidation and reduction are constantly occurring within the tissues of the living body.

SEAT OF OXIDATION AND REDUCTION IN THE BODY.

The exact place where these processes occur and the exact manner in which they take place have still to be made out, but a great deal of information on these subjects has been obtained by Ehrlich in a most interesting and important research.

Oxidation and Reduction of Aniline Colours.—By the introduction of various aniline compounds into the circulation of living animals, either directly into the veins or indirectly by subcutaneous injection, Ehrlich has been able to show that constant processes of oxidation and reduction are going on throughout the animal body generally, but with very different intensity in the different organs and tissues.

Comparative Intensity of Respiratory Processes in Different Tissues.—In those whose functional activity is small, such as connective tissue, these processes go on slowly, but they go on rapidly in organs where the functional activity is great, as in the heart, the brain, and some of the unstriated and striated muscles.

Intensity of Reducing Power of Cells.—The power of the living cell to effect chemical changes in the substances which it absorbs is almost incredible, for alizarin blue, one of the substances which Ehrlich has employed, can only be reduced by the most powerful reagents outside the body, for example, by boiling with caustic potash and grape sugar, and yet it is completely reduced within the living body by the liver and by the cortical substance of the kidney, and is rapidly reduced after death by the heart, liver, and muscular substance. When reduced it becomes white, but when oxidized it becomes blue, and thus the comparative amount of reduction in the tissues can be estimated by their colour.

Limits of the Reducing Power of the Tissues.—The alizarin blue is injected in the oxidized or blue state, and circulates in this condition in the blood, for the serum and also the fluid of the aqueous chamber of the eye have a distinct blue colour. Most of the organs of animals into which it has been injected have a blue colour, with the exception of those I have already mentioned. This shows that the reducing power necessary to change it from blue into white is greater than most of the tissues possess.

By using another pigment—indophenol blue, which is more easily reduced than alizarin blue—Ehrlich found that reduction occurred in almost all the tissues. It is evident then, that, as very few tissues can reduce alizarin blue and almost all can reduce indophenol blue, the reducing power of the cells lies between the limits fixed by those two substances.

Tissues like a "Damped" Furnace.—The fact that the tissues possess this power of reduction shows that they are not saturated with oxygen, and yet they possess a sufficient amount of oxygen to enable them to carry on their functions. Their conditions might be likened to that of a furnace where the entrance of air was so restricted as to allow sufficient but not too rapid combustion to occur, so that if the ventilator were opened and more air allowed to enter the furnace, fires would at once burn more hotly. In the case of the tissues of the greatest functional activity, such as the heart and brain, the supply of oxygen must be very free, and that it is so is shown by the fact that they do not reduce alizarin blue during life, though they rapidly do so after death, and the brain will also do it during life if excited by electrical stimulation. In order to explain the processes of reduction and oxidation going on in cells, Ehrlich supposes that in the protoplasm we have certain chemical groups which will take up oxygen readily and will give it off to others with which it forms acid products.

SEAT OF OXIDATION AND REDUCTION IN THE CELL.

Respiratory Zones of the Cell.—In the living protoplasm he supposes there are three zones, the first having the greatest affinity for oxygen. This is usually saturated, and forms the reserve of oxygen for the use of the cell. The second zone is that which is functionally active during the life of the cell, sometimes oxidized. The third is always unoxidized, and is constantly exercising an attraction for the oxygen of the blood or lymph.

Alteration in Power of Reducing by Changes in Reaction.—It may well be supposed that the affinity of protoplasm for oxygen may be altered in a similar way to that of indophenol white, which, like protoplasm, is readily capable of undergoing alternate oxidation and reduction. In an alkaline solution the affinity of indophenol white for oxygen is very strong, and it readily becomes oxidized to indophenol blue by the oxygen of the air. But in a neutral solution its affinity for oxygen becomes slight, and in an acid solution is completely destroyed, so that in such a

solution it no longer tends to attract oxygen, but on the contrary gives it off readily, and consequently reducing agents quickly convert it into indophenol white. When the acid is neutralised and alkalinity restored, the attraction for oxygen is increased, and the oxidized blue product is again formed, notwithstanding the continued presence of a reducing agent in the solution.

On again acidulating, reduction occurs, and the same cycle of changes between oxidation and reduction can be produced at will by mere changes in the reaction of the liquid, until the whole of the reducing substance is oxidized.

Effect of Functional Activity on the Reaction of Cells.—That similar changes of oxidation and reduction in the protoplasm of cells are largely influenced by their reaction has been found by Ehrlich to be the case, for by using another aniline colour which is a delicate reagent for acidity, along with indophenol blue, he noticed that reduction of the latter substance occurred when indication of acid reaction was given by the former.

REGULATION OF OXIDATION IN THE CELL.

The production of acidity, or rather, in most cases, the diminution of alkalinity in the protoplasm, lessens its affinity for oxygen, and thus the process of combustion in the cell is diminished or arrested by the formation of acid, though oxidation again begins as soon as the circulating blood or lymph has restored its alkaline reaction. The activity of the cell tends to generate acid products of tissue waste, and these will be formed all the more quickly the more actively the functions of the cell are going on. But their accumulation will tend to lessen the alkalinity of the cell, and consequently its affinity for oxygen. The processes of combustion will then diminish or stop entirely until the waste products have been removed. There is thus a sort of self-acting mechanism in the cell, which, to a certain extent, regulates oxidation within it. Yet this regulating arrangement, which might be likened to the appetite, which prevents reasonable people from eating too much, does not seem to be enough, for we find a further one, which actually prevents the oxygen from getting to the protoplasm, and, with the few exceptions of the brain, heart, and some of the muscles, the tissues of the body are shown by their reducing power to have only a restricted supply of oxygen, or, in other words, are burning like a furnace fire with partially closed dampers. Now the question arises, how is the supply of oxygen to the protoplasm restricted, and how is it that the supply may be, if necessary, increased? The damper which restrains combustion in the cell is, according to Ehrlich, the paraplasm, or cell juice which surrounds the protoplasm. This paraplasm presents considerable resistance to the diffusion of oxygen through it, and thus restricts the quantity which reaches the protoplasm.

Effect of Contraction of Protoplasm on its Respiratory Processes.—The amount of oxygen which will pass through the paraplasm and combine with the protoplasm will vary according to the thickness of the paraplasm and to the area of surface of the protoplasm. When the protoplasm is contracted to its utmost extent, it will form a globe presenting a minimum surface to attract oxygen, and with a maximum thickness of paraplasm around it. When the protoplasm is extended it will present a maximum surface with a diminished thickness of paraplasm. It will therefore attract oxygen more readily, and combustion will go on more quickly within it.

ATTEMPTED EXPLANATION OF THE ACTION OF ANTIPYRETICS.

Let us now see if we can apply these data in explanation of the action of antipyretics.

In the Croonian Lectures last year Dr. McAlister informed us that a number of antipyretics had been shown to affect the temperature of the body by acting upon definite centres in the brain, but he also told us that the chief seats of combustion in the body by which temperature is maintained are the muscles and the glands. At present, as far as I know, we have no very satisfactory explanation of the mode in which these structures are affected by stimulation of the thermal centres. If we suppose, however, that stimulation of these centres causes contraction of the protoplasm in muscle and gland cells, so that its attracting surface to oxygen would be diminished, and the resistance to the passage to oxygen through the paraplasm increased in the way I have just described, we can see that oxidation would probably be greatly lessened and the temperature correspondingly reduced.

Binz's Work on Quinine.—The study of antipyretics received a great impetus, and, indeed, might almost be said to have started, from the work of Binz on quinine. From his experiments two very striking facts resulted. The one was that quinine had the power to lower the temperature in febrile conditions which were not due to malaria; the other was that quinine had an extraordinary power of arresting the movements of leucocytes, causing them to draw in their pseudopods, and to contract into a sphere. In the case of free cells like the white blood corpuscles we can see that such a contraction as this will considerably lessen the surface of protoplasm exposed to oxidation, but one can hardly see how the change of form is likely to interpose any obstacle between the oxygen contained in the serum surrounding the cell and the protoplasm. The case is different, however, if we take such a structure as the pigment cell of the frog. Here the protoplasm does not fill the whole cell equally at all times; occasionally it stretches itself out into all the ramifications of the branching cell, and then it will not only allow a large surface for oxidation, but will be separated by a comparatively thin layer of paraplasm from the lymph or interstitial fluid by which the cell is nourished. When the protoplasm contracts it forms a rounded mass in the centre of the cell, and then presents a minimum of surface for oxidation, and at the same time a maximum thickness of paraplasm is interposed between it and the cell wall. If we suppose that quinine produces an effect upon the protoplasm of cells composing the tissues of the body similar to that which it has upon leucocytes, we can at once see how it will lessen oxidation in the tissues, and thus act as an antipyretic. Nor is it necessary to assume that it exerts this effect directly upon the tissues themselves. The result will be the same if it stimulates thermal centres in the brain and spinal cord, and causes contraction of the protoplasm through them.

Why Antipyretics do not Reduce the Temperature in Health.—This hypothesis also enables us to explain the fact that antipyretics have comparatively little action upon the temperatures of the healthy body, although they readily reduce the temperature in fever. For if the protoplasm in the cells of the healthy body be in a state of chronic contraction, so that its contour is not far removed from the sphere, contraction will produce but little effect upon it. If, however, it be more diffused through the cell—as we might assume it would be in fever, and, as Lister has shown it to be in inflammation*—the effect of causing it to contract would be very well marked both in regard to the change in shape and the change in its respiratory function.

Relation of Physical and Vital Phenomena.—It seems almost ridiculous to speak of the colour of the skin on a frog's back in relation to the treatment of a patient suffering from fever, but Lister has discussed it in his paper on inflammation, and Edward Jenner, the im-

* Joseph Lister, *Phil. Trans.*, 1858, pp. 627–645.

mortal discoverer of vaccination, noticed it in connection with the occurrence of rheumatism as well as with the swelling of dry wood under the influence of an atmosphere loaded with moisture. His poem on the signs of rain is so good that I feel almost tempted to quote it in its entirety, but, nevertheless, I will restrict myself to quoting the lines directly bearing on this subject. He says :—

Hark! how the chairs and tables crack;
Old Betty's joints are on the rack;
The frog has lost his yellow vest,
And in a russet coat is drest.

The experiments of Lister and Brücke have shown that the darker colour is due to the extension of the protoplasm containing dark coloured granules throughout the cell, while the yellow colour is simply due to the contraction of the protoplasm drawing the granules together into one compact clump and allowing the yellow colour of the cells below to appear. In some experiments made by Dr. Cash and myself on the action of various bodies belonging to the aromatic series, I was struck by the fact that in poisoning by some of them contraction of the pigment cells was a somewhat prominent feature.

Some other experiments by Mr. Bokenham and myself on antipyrin have given a contrary result, as the drug seemed rather to produce russet colour. On the other hand, knowing that iodoform had the power of stopping the movements of leucocytes, it occurred to me that it ought to have an antipyretic action, and, on looking up the subject, I found that it had. This subject is evidently one in which a very great deal more investigation is required before any conclusions can be arrived at. Yet I have thought it worth while to bring these facts and ideas before you, both because Brieger's observations seemed to open out whole fields for investigation, and because the relationship which I have endeavoured to trace between them and the explanation of the action of drugs may render them more interesting to men engaged in the practical treatment of disease.*

ANÆSTHETICS.

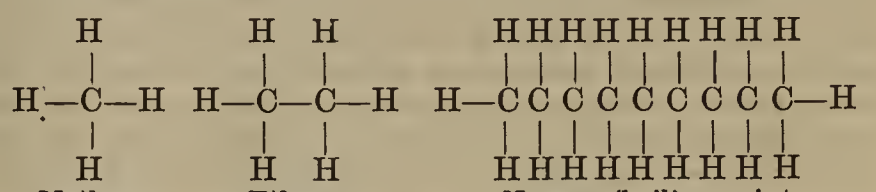
I have already said that one of the greatest improvements in modern surgery is the introduction of anæsthetics.

Alcohol as an Anæsthetic.—The observation that pain can be abolished by alcohol is a very old one, for Solomon makes the drunkard say: "They have beaten me, and I felt it not," and apparently he determined to use it deliberately to prevent pain, for he says: "I will seek it (strong drink) yet again." The use of drugs to abolish pain in surgical operations has probably never been entirely forgotten, but their general and systematic employment only commenced with the use of nitrous oxide by Wells, in 1844, and of ether by his pupil, Morton. Shortly afterwards a great number of substances were tried by Simpson, with the result that he chose chloroform as being the most convenient and safe. The power of producing anæsthesia, or perhaps I should say more definitely, the power not only to abolish pain and thus render an operation unfelt by the sufferer, but to abolish reflex action, so that the surgeon may be able to operate more easily, is common to most of the substances of the fatty or alcoholic series. But it is greatly modified by two circumstances: (1) the position in the fatty or alcoholic group of the radical or alkyl which forms the basis of the substance; and (2) the nature of the element or radical with which the alkyl is combined.

* Another interesting question might be to inquire whether any relationship exists between the power of aromatic substances to remove the russet colour from a frog's back and the rheumatic pains which Jenner notices as indications of approaching rain.

EFFECT OF INCREASE IN THE NUMBER OF COMPONENT ATOMS IN BODIES OF THE ALCOHOL SERIES.

It may be worth while to revert here to the illustration of a pocket-knife which I used at an earlier part of these lectures. Let us imagine it tied to the end of a fishing-rod. The fishing-rod represents the radical, and the number of joints in it determines its position in the series. A single joint might represent methane, CH_3, and each additional joint may symbolize the addition of CH_2 to the radical. A single joint might be too short to reach as far as we wished, but each additional joint would increase not only the length but the weight of the rod, until it became too awkward to be useful or too cumbrous to be lifted at all. Now something similar occurs with the members of the fatty alcoholic series. Every addition of carbon with hydrogen, CH_2, makes them heavier and more cumbrous. The members of the series beginning with methane, or marsh gas, which is a light gas, become gradually heavier and less volatile as the number of carbon atoms



they contain increases. Petroleum ether, which is a mixture of pentane, C_5H_{12}, and hexane, C_6H_{14}, is a light, mobile fluid; higher members of the series form the soft paraffin or vaseline, while those that are higher still form hard paraffin.

EFFECT OF THE STRUCTURE OF CARBON COMPOUNDS.

But the instrument consisting of a fishing-rod and a pocket-knife can be altered by changing the knife as well as by changing the number of joints in the rod. If in place of opening a gimlet point, which we may compare to hydrogen, I open a knife blade, which we may compare to hydroxyl, I change the character of the instrument. If I open a blade at the end and one at the side I again alter its capacity for cutting, and if I replace the knife altogether by a dumbbell, I may make the instrument into a club rather too heavy to wield.

Effect of Different Radicals on Alkyls.—Thus in the case of the alkyls their action differs according as they are combined with hydrogen in the hydrides, with hydroxyl, OH, in the alcohols, or with both oxygen and hydroxyl, as in the acids.

Moreover, both their physical condition and physiological action may be changed by replacing hydrogen by other elements. Thus, if we replace three atoms of hydrogen in marsh gas, CH_4, by chlorine, which has an atomic weight of 35·5, while that of hydrogen is only 1, we convert the light gas with a molecular weight of 16 into the heavy liquid, chloroform, with a molecular weight of 119·5. If in place of three atoms of chlorine we introduce three of iodine, each having a weight of 127, the molecular weight of the whole compound becomes 394, and in place of a permanent gas like marsh gas, or a heavy fluid like chloroform, we get a solid like iodoform.

The physical condition of the substance may be influenced by the number of atoms of other elements which combine with an alkyl as well as by their nature. Thus, when only one atom of hydrogen in methane, CH_4, is replaced by chlorine, the resulting monochlormethane, CH_3Cl, or methyl chloride, is a gas at ordinary temperature, although it can be condensed by cold and pressure to a liquid which boils at 22°. Dichlormethane, or methylene chloride, CH_2Cl_2, is a heavy liquid boiling at 41°, and the trichlorme-

thane, or chloroform, $CHCl_3$, is a still heavier liquid, which boils at 61°. It appears, then, that we can increase the atomic weight of an anæsthetic, and render it more solid by adding on carbon to the alkyl, or by replacing hydrogen with heavier atoms like chlorine or iodine. The more hydrogen atoms are thus replaced, the denser does it become, so that it may pass from a gas to a liquid, and then to a solid at ordinary temperatures.

Effect of Alkyls on Nerve Centres.—It is probable, as I have said, that all the substances belonging to the alcoholic series possess the power of abolishing to a greater or less extent the excitability of all the nerve centres within the body. They appear to act upon those centres in the inverse order of their development, destroying first the functional activity of the highest ideational and volitional centres in the cerebrum, those centres which are the latest to be developed, and which not only raise man above the animals, but raise individual men above their fellows. As their action increases nerve centres of a lower development are affected or, as Hughlings Jackson puts it, the most highly organized centres are affected first, while the lowest, most simple, and at the same time most automatic and stable centres are affected last. The perceptive and motor ganglia, the reflex centres of the cord, the vasometer and respiratory centres and the heart, all become paralysed when the action of the members of this group is pushed to its utmost extremity.

Different Action of the Members of the Alcoholic Group.—But they are not all rendered inactive in the same order by each member of the group. On this account some members are useful as hypnotics, simply inducing sleep as one of the first results of their action, although if the dose be large, the sleep may pass into complete unconsciousness and anæsthesia with loss of reflex action. For the production of prolonged sleep we require a substance whose action will be slight and at the same time prolonged. But for anæsthesia, we require a substance which will act rapidly and powerfully, but will be quickly eliminated and cease to act very shortly after its administration is discontinued. We therefore look for hypnotics among the substances which have a heavy molecule, and are either liquid or solid in form, so that they may be given by the mouth, and being absorbed into the blood, continue to act for a length of time. We look for our anæsthetics amongst the lower members of the series which have a light molecular weight, and are either gases or volatile liquids. Although heavy liquids like paraldehyde, or solids like chloral hydrate, will act as anæsthetics when given in large doses, yet their use as such would be very dangerous, for the line between their anæsthetic action and the paralysing action on the respiratory centre or heart is very narrow, and might easily be crossed by very slight excess in dose. The elimination of such substances being slow, we cannot at once get rid of their effects of excess in the same way as we can in the case of those which, like ether, enter the lungs as vapour and are readily eliminated. It will, therefore, be convenient to consider the action of hypnotics and anæsthetics separately, although they may belong to the same chemical group.

MODIFICATION OF ACTION OF ANÆSTHETICS AND HYPNOTICS IN NERVOUS TISSUE.

But it may nevertheless be advisable to consider the mode in which they both act on nervous tissue at this time. We may divide the theories of action into three:

First, that they alter the blood in such a way as to render it incapable of maintaining the functional activity of the nerve cells.

Secondly, that they alter the circulation.

Thirdly, that they affect the nervous tissue itself.

Some anæsthetics, such as nitrogen, nitrous oxide, and possibly marsh gas, and some of the other hydrides of the alcohol series, produce anæsthesia by a sort of process of suffocation, by excluding oxygen from the lungs, while the movements of respiration continue to go on. The reason for supposing that these substances simply act by exclusion of air is chiefly that in an animal breathing nitrous oxide anæsthesia comes on at the moment when the blood becomes quite venous; and the anæsthesia does not come on when the nitrous oxide is sufficiently mixed with air. But for my own part I am inclined to believe that the nitrous oxide has an action of its own on the nerve centres, and does not simply exclude oxygen from the blood. For while we might regard the anæsthesia produced by this gas as simply due to suffocation, we cannot explain its curious stimulant action in this way, the symptoms it produces when mixed with air having nothing in common with those of suffocation.

"*Salt Frog.*"—The second theory that the anæsthetic action of drugs is due to their arresting or diminishing circulation in the nerve centres has been disproved in regard to the most important anæsthetics by a very simple experiment. When all the blood has been removed from a frog and its vessels have been washed out with a weak saline solution, it still remains active for a certain time; but if such a frog be placed in an atmosphere saturated with chloroform or ether, it becomes narcotized.

Effect of Circulation.—But while the action of anæsthetics cannot be wholly explained by exchanges in the circulation, they are very important, as we shall afterwards find, in regard to the action of hypnotics, and anæsthesia has actually been induced and operations performed by suddenly checking the circulation in the brain.

We now come to the third theory—that anæsthetics affect the nervous tissue itself. The experiment already mentioned of anæsthetizing a "salt frog" with chloroform shows conclusively that anæsthesia is due to the action of the chloroform on the brain.

Semi-coagulation.—The nature of this action has been supposed by Heinrich Ranke to consist in a "transient fixation" of the albuminous molecules in the ganglion cells of the cerebral cortex, as well as in the nervous and muscular fibres. Claude Bernard and Binz have expressed similar views, and Bernard has used the term "semi-coagulation" to express the condition which occurs in the nerve cells, and probably this is nearly correct. The condition is, however, so transient that it might perhaps be better compared to the tetanic contraction of muscle, which quickly ceases when the irritant is taken away. In all probability, the condition of anæsthesia and of tetanus are both to be regarded as the first stages of coagulation, and, if sufficiently prolonged, complete coagulation and death of the tissue will occur. A curious likeness, indeed, was found by Ranke between the action of anæsthetics on the brain and on muscles; for they coagulate the albuminous substances extracted from both, and when injected into an artery they produce rigor mortis in the muscles it supplies.

Effect of Different Members of the Alcoholic Group upon Albuminous Substances.—In order to get a chemical basis for the action of alcoholic substances on nervous structures it seemed to me advisable to ascertain the action of such substance on albuminous bodies. Dr. Sidney Martin and I have therefore commenced a research on this subject, and although it is far more complete, we have already obtained the interesting result that while the lower alcohols—methyl, ethyl, and propyl alcohols—coagulate albumen almost completely, the butyl alcohols have less effect, and any precipitate they may produce is soluble, while the higher alcohols—amyl and heptyl—do not coagulate at all.

Chemical Affinity between Narcotics and Nervous Tissues.—There can, I think, be little doubt that there is an affinity between many, perhaps all, the bodies belonging to the alcoholic series and the substances of which the nerve centres are composed. In all probability they enter into a loose combination with the nervous tissue for a time, and interfere with the process of oxidation and reduction on which its activity depends. As Binz has well expressed it, morphine, chloral, ether and chloroform, possess a strong affinity for the substance of the cerebral cortex in man. This combines for a while with the hypnotics carried to it by the blood and by the resulting alteration in its tissue change, "lessening of the dissociation of the living matter," in Pflüger's sense, it becomes unable to perform the functions of the waking condition.

(*To be continued.*)

ROYAL INSTITUTION OF GREAT BRITAIN.

ALUMINIUM.*

BY SIR HENRY ROSCOE, M.P., D.C.L., LL.D., V.P.R.S.

Chemists of many lands have contributed to our knowledge of the metal aluminium. Davy, in 1807, tried in vain to reduce alumina by means of the electric current. Oerstedt, the Dane, in 1824, pointed out that the metal could be obtained by treating the chloride with an alkali metal; this was accomplished in Germany by Wöhler in 1827, and more completely in 1845, whilst in 1854, Bunsen showed how the metal can be obtained by electrolysis. But it is to France, by the hands of Henri St. Claire Deville, in the same year, that the honour belongs of having first prepared aluminium in a state of purity, and of obtaining it on a scale which enabled its valuable properties to be recognized and made available, and the bar of "silver-white metal from clay," was one of the chemical wonders in the first Paris Exhibition of 1855. Now England and America step in, and I have this evening to relate the important changes which further investigation has effected in the metallurgy of aluminium. The process suggested by Oerstedt, carried out by Wöhler, and modified by Deville, remains in principle unchanged. The metal is prepared, as before, by a reduction of the double chloride of aluminium and sodium, by means of metallic sodium in presence of cryolite; and it is therefore not so much a description of a new reaction as of improvements of old ones of which I have to speak.

I may perhaps be allowed to remind my hearers that more than thirty-three years ago, Mr. Barlow, then Secretary to the Institution, delivered a discourse, in the presence of M. Deville, on the properties and mode of preparation of aluminium, then a novelty. He stated that the metal was then sold at the rate of £3 per ounce, and the exhibition of a small ingot, cast in the laboratory by M. Deville, was considered remarkable. As indicating the progress since made, I may remark that the metal is now sold at 20*s.* per lb., and manufactured by the ton, by the Aluminium Company, at their works at Oldbury, near Birmingham. The improvements which have been made in this manufacture by the zeal and energy of Mr. Castner, an American metallurgist, are of so important a character that the process may properly be termed the Deville-Castner process.

The production of aluminium previous to 1887, probably did not exceed 10,000 lbs. per annum, whilst the price at that time was very high. To attain even this production required that at least 100,000 lbs. of double chloride, and 40,000 lbs. of sodium should be manufactured annually. From these figures an idea of the magnitude of the undertaking assumed by the Aluminium Company may be estimated, when we learn that they erected works having an annual producing capacity of 100,000 lbs. of aluminium. To accomplish this required not only that at least 400,000 lbs. of sodium, 800,000 lbs. of chlorine, and 1,000,000 lbs. of double chloride, should be annually manufactured, but in addition that each of these materials should be produced at a very low cost, in order to enable the metal to be sold at 20*s.* per lb.

The works, which now cover a space of nearly five acres, are divided into five separate departments, viz., 1st, sodium; 2nd, chlorine; 3rd, chloride; 4th, aluminium; and 5th, foundry, rolling, wire mills, etc.

In each department an accurate account is kept of the production each day, the amount of material used, the different furnaces and apparatus in operation, etc. In this manner it has been found possible to ascertain each day exactly how the different processes are progressing, and what effect any modification has, either on cost, quantity, or quality of product. By this means a complicated chemical process is reduced to a series of very simple operations, so that whilst the processes are apparently complicated and difficult to carry out successfully, this is not the case now that the details connected with the manufacture have been perfected, and each operation carried on quite independently until the final materials are brought together for the production of the aluminium.

Manufacture of Sodium.

The first improvement occurs in the manufacture of sodium by what is known as the "Castner Process." The successful working of this process marks an era in the production of sodium, as it not only has greatly cheapened the metal, but has enabled the manufacture to be carried out upon a very large scale with little or no danger. Practically, the process consists in heating fused caustic soda in contact with carbon, whilst the former substance is in a perfectly liquid condition. By the process in vogue before the introduction of this method, it was always deemed necessary that special means should be taken to guard against actual fusion of the mixed charges, which if it were to take place, would to a large extent allow the alkali and reducing material to separate. Thus having an infusible charge to heat, requiring the employment of a very high temperature for its decomposition, the iron vessels must be of small circumference to allow the penetration of the heat to the centre of the charge without actually melting the vessel in which the materials are heated. By the new process, owing to the alkali being in a fused or perfectly liquid condition in contact directly with carbon, the necessity of this is avoided, and consequently, the reduction can be carried on in large vessels at a comparatively low temperature. The reaction taking place may be expressed as follows:—$3\,NaHO + C = Na_2CO_3 + 3\,H + Na$.

The vessels in which the charges of alkali and reducing material are heated are of egg-shaped pattern, about 18 inches in width at their widest part and about 3 feet high, and are made in two portions, the lower one being actually in the form of a crucible, while the upper one is provided with an upright stem and a protruding hollow arm. This part of the apparatus is known as the cover. In commencing the operation, these covers are raised in the heated furnace through apertures provided in the floor of the heated chamber, and are then fastened in their place by an attachment adjusted to the stem; the hollow arm extends outside the furnace. Directly below each aperture in the bottom of the furnace are situated the hydraulic lifts; attached to the top of which are the platforms upon which are placed the crucibles to be raised into the furnace. Attached to the hydraulic lifts are the usual reversing valves for lowering or raising, and the platform is of such a size as, when raised, completely to fill the bottom aperture of the furnace. The charged

* Read at a Weekly Evening Meeting, Friday, May 3.

crucible, being placed upon the platform, is raised into its position, the edges meeting those of the cover, forming an air-tight joint which prevents the escape of gas and vapour from the vessel during reduction, except by the hollow arm provided for this purpose. The natural expansion of the iron vessels is accommodated by the water-pressure in the hydraulic lifts, so that the joint of the cover and crucible are not disturbed until it is intended to lower the lift for the purpose of removing the crucible.

The length of time required for the first operation of reduction and distillation is about two hours. At the end of this time the crucibles are lowered, taken from the platforms by a large pair of tongs on wheels, carried to a dumping pit, and thrown on their side. The residue is cleaned out, and the hot pot, being again gripped by the tongs, is taken back to the furnace. On its way, the charge of alkali and reducing material is thrown in. It is again placed on the lift and raised in position against the edges of the cover. The time consumed in making the change is one and a half minute, and it only requires about seven minutes to draw, empty, recharge, and replace the five crucibles in each furnace. In this manner the crucibles retain the greater amount of their heat, so that the operation of reduction and distillation now only requires one hour and ten minutes. Each of the four furnaces, of five crucibles each, when in operation, are drawn alternately, so that the process is carried on night and day.

Attached to the protruding hollow arm from the cover are the condensers, which are of a peculiar pattern specially adapted to this process, being quite different from those formerly used. They are about 5 inches in diameter, and nearly 3 feet long, and have a small opening in the bottom about 20 inches from the nozzle. The bottom of these condensers is so inclined that the metal condensed from the vapour issuing from the crucible during reduction, flows down and out into a small pot placed directly below this opening. The uncondensed gases escape from the condenser at the further end, and burn with the characteristic sodium flame. The condensers are also provided with a small hinged door at the further end, by means of which the workmen from time to time may look in to observe how the distillation is progressing. Previous to drawing the crucibles from the furnace for the purpose of emptying and recharging, the small pots each containing the distilled metal are removed, and empty ones substituted. Those removed each contain on an average about 6 lbs. of metal, and are taken directly to the sodium casting shop, where it is melted and cast, either into large bars ready to be used for making aluminium, or in smaller sticks to be sold.

Special care is taken to keep the temperature of the furnaces at about 1000° C., and the gas and air valves are carefully regulated, so as to maintain as even a temperature as possible. The covers remain in the furnace from Sunday night to Saturday afternoon, and the crucibles are kept in use until they are worn out, when new ones are substituted without interrupting the general running of the furnace. A furnace in operation requires 250 lbs. of caustic soda every one hour and ten minutes, and yields in the same time 30 lbs. of sodium, and about 240 pounds of crude carbonate of soda. With the four furnaces at work 120 lbs. of sodium can be made every seventy minutes, or over a ton in the twenty-four hours. The residual carbonate, on treatment with lime in the usual manner, yields two-thirds of the original amount of caustic operated upon. The sodium, after being cast, is saturated with kerosene oil, and stored in large tanks holding several tons, placed in rooms specially designed both for security against either fire and water.

Chlorine Manufacture.

This part of the works is connected with the adjacent works of Messrs. Chance Bros. by a large gutta-percha pipe, by means of which from time to time hydrochloric acid is supplied direct into the large storage cisterns, from which it is used as desired for making the chlorine. For the preparation of the chlorine gas needed in making the chloride, the usual method is employed; that is, hydrochloric acid and manganese dioxide are heated together, when chlorine gas is evolved with effervescence, and is led away by earthenware and lead pipes to large lead-lined gasometers, where it is stored.

The materials for the generation of the chlorine are brought together in large tanks, or stills, built up out of great sandstone slabs, having rubber joints, and the heating is effected by the injection of steam. The evolution of gas, at first rapid, becomes gradually slower, and at last stops; the hydrochloric acid and manganese dioxide being converted into chlorine and manganous chloride. This last compound remains dissolved in the "spent still liquor" and is reconverted into manganese dioxide, to be used over again, by Weldon's Manganese Recovery Process. Owing to the difficulty of keeping up a regular supply of chlorine under a constant pressure directly from the stills, in order that the quantity passed into the sixty different retorts in which the double-chloride is made can be regulated and fed as desired, four large gasometers were erected. Each of these is capable of holding 1,000 cubic feet of gas, and is completely lined with lead, as are all the connecting mains, etc., this being the only available metal which withstands the corrosive action of chlorine. The gasometers are filled in turn from the stills, the chlorine consumed being taken direct from a gasometer under a regular pressure until it is exhausted, the valves being changed, the supply is taken from another holder, the emptied one being refilled from the still.

Manufacture of the Double Chloride.

Twelve large regenerative gas furnaces are used for heating, and in each of these are fixed five horizontal fire-clay retorts about 10 ft. in length, into which the mixture for making the double chloride is placed. These furnaces have been built in two rows, six on a side, the clear passage-way down the centre of the building, which is about 250 ft. long, being 50 ft. in width. Above this central passage is the staging, carrying the large lead-mains for the supply of the chlorine coming from the gasometers. Opposite each retort and attached to the main, are situated the regulating valves, connected with lead and earthenware pipes, for the regulation and passage of the chlorine to each retort. The valves are of peculiar design, and have been so constructed that the chlorine is made to pass through a certain depth of liquid, which not only by opposing a certain pressure allows a known quantity of gas to pass in a given time, but also prevents any return from the retort into the main, should an increase of pressure be suddenly developed in the retorts.

The mixture with which the retorts are charged is made by grinding together hydrate of alumina, salt, and charcoal. This mixture is then moistened with water, which partially dissolves the salt, and thrown into a pug mill of the usual type for making drain pipes, excepting that the mass is forced out into solid cylindrical lengths upon a platform alongside of which a workman is stationed with a large knife, by means of which the material is cut into lengths of about 3 inches each. These are then piled on top of the large furnaces to dry. In a few hours they have sufficiently hardened to allow of their being handled. They are then transferred to large wagons, and are ready to be used in charging the retorts.

The success of this process is in a great measure dependent—1st, on the proportionate mixture of

materials; 2nd, on the temperature of the furnace; 3rd, on the quantity of chlorine introduced in a given time; and 4th, on the actual construction of the retorts. I am, however, not at liberty to discuss the details of this part of the process, which have only a commercial interest. In carrying on the operation, the furnaces or retorts, when at the proper temperature, are charged by throwing in the balls until they are quite full, the fronts are then sealed up, and the charge allowed to remain undisturbed for about four hours, during which time the water of the alumina hydrate is completely expelled. At the end of this time the valves on the chlorine main are opened, and the gas is allowed to pass into the charged retorts. In the rear of each retort, and connected therewith by means of an earthenware pipe, are the condenser boxes, which are built in brick. These boxes are provided with openings or doors, and also with earthenware pipes connected with a small flue for carrying off the uncondensed vapours to the large chimney. At first the chlorine passed into each retort is all absorbed by the charge, and only carbonic oxide escapes into the open boxes, where it burns. After a certain time, however, dense fumes are evolved, and the boxes are then closed, while the connecting pipe between the box and the small flue serves to carry off the uncondensed vapours to the chimney.

The reaction which takes place is as follows:—

$$Al_2O_3 + 2NaCl + 3C + 6Cl = 2AlCl_3NaCl + 3CO.$$

The chlorine is passed in for about seventy-two hours in varying quantity, the boxes at the back being opened from time to time by the workmen to ascertain the progress of the distillation. At the end of the time mentioned the chlorine valves are closed and the boxes at the back of the furnace are all thrown open. The crude double chloride, as distilled from the retorts, condenses in the connecting pipe and trickles down into the boxes, where it solidifies in large irregular masses. The yield from a bench of five retorts will average from 1600 to 1800 lbs., which is not far from the theoretical quantity. After the removal of the crude chloride from the condenser boxes the retorts are opened at their charging end, and the residue, which consists of a small quantity of alumina, charcoal and salt, is raked out and remixed in certain proportions with fresh material, to be used over again. The furnace is immediately re-charged and the same operations repeated, so that from each furnace upwards of 3500 lbs. of chloride are obtained weekly. With ten or twelve furnaces always at work the plant is easily capable of producing 30,000 lbs. of chloride per week, or 1,500,000 lbs. per annum.

Owing to the presence of iron, both in the materials used (viz., charcoal, alumina, etc.) and in the fireclay composing the retorts, the distilled chloride always contains a varying proportion of this metal in the form of ferrous and ferric chlorides. When it is remembered that it requires 10 lbs. of this chloride to produce 1 lb. of aluminium by reduction, it will be quite apparent how materially a very small percentage of iron in the chloride will influence the quality of the resulting metal. I may say that, exercising the utmost care as to the purity of the alumina and the charcoal used, and after having the retorts made of special fireclay containing only a very small percentage of iron, it was found almost impossible to produce upon a large scale a chloride containing less than 0·3 per cent. of iron.

This crude double chloride, as it is now called at the works, is highly deliquescent, and varies in colour from a light yellow to a dark red. The variation in colour is not so much due to the varying percentage of iron contained as to the relative proportion of ferric or ferrous chlorides present, and although a sample may be either very dark or quite light, it may still contain only a small percentage of iron if it be present as ferric salt, or a very large percentage if it is in the ferrous condition. Even when exercising all possible precautions, the average analysis of the crude double chloride shows about 0·4 per cent. of iron. The metal subsequently made from this chloride therefore never contained much less than about 5 per cent. of iron, and, as this quantity greatly injures the capacity of aluminium for drawing into wire, rolling, etc., the metal thus obtained required to be refined. This was successfully accomplished by Mr. Castner and his able assistant, Mr. Cullen, and for some time all the metal made was refined, the iron being lowered to about 2 per cent.

The process, however, was difficult to carry out, and required careful manipulation, but as it then seemed the only remedy for effectively removing the iron, it was adopted and carried on for some time quite successfully, until another invention of Mr. Castner rendered it totally unnecessary. This consisted in purifying the double chloride before reduction. I cannot now explain this process, but I am able to show some of the product. This purified chloride, or pure double chloride, is, as you see, quite white, and is far less deliquescent than the crude, so that it is quite reasonable to infer that this most undesirable property is greatly due to the former presence of iron chlorides. I have seen large quantities, containing upwards of 1½ per cent. of iron, or 150 lbs. to 10,000 of the chloride, completely purified from iron in a few minutes, so that, whilst the substance before treatment was wholly unfit for the preparation of aluminium, owing to the presence of iron, the result was, like the sample exhibited, a mass containing only 1 lb. of iron in 10,000, or 0·01 per cent. The process is extremely simple, and adds little or no appreciable cost to the final product. After treatment, this pure chloride is melted in large iron pots and run into drums similar to those used for storing caustic soda. As far as I am aware, it was generally believed to be an impossibility to remove the iron from anhydrous double chloride of aluminium and sodium, and few, if any, chemists have ever seen a pure white double chloride.

(*To be concluded.*)

Provincial Transactions.

INVERNESS CHEMISTS' AND DRUGGISTS' ASSOCIATION.

At the July meeting of the Chemists and Druggists' Association the following resolution was unanimously agreed to:—"That the Chemists and Druggists' Association resolve to enter in their minutes an expression of their deep regret at the death of Mr. George Ross Galloway, also of the high estimation in which he was held by his brother chemists, and further, that they desire to express their deep sympathy with his family in their bereavement, and request the Secretary to send them a copy of this resolution."

Obituary.

Notice has been received of the death of the following:—

On the 4th of July, Mr. Richard Forrest, Pharmaceutical Chemist, at the age of 58 years. Mr. Forrest was formerly with Messrs. J. Bell and Co., Oxford Street, but afterwards entered the wholesale trade and represented the house of Barron, Squire and Co., Bush Lane, for many years. He became an Associate of the Pharmaceutical Society in 1852 and a Member in 1857 and remained connected with the Society until his death.

Parliamentary and Law Proceedings.

Prosecution under the Pharmacy Act.

At the Ipswich County Court, on Wednesday, the 10th inst., before his Honour the Judge (Sir Francis Roxburgh, Q.C.), an action came on for hearing, in which the plaintiffs were the Pharmaceutical Society of Great Britain, and the defendant, Mr. Thomas Eastaway, of 16, Westgate Street, Ipswich. The particulars of the claims were as follows:—

For amount of penalty incurred by the defendant on April 13, 1889, in selling, or keeping open shop for the retailing, dispensing or compounding of poison, to wit, "tincture of opium," contrary to the provisions of the Pharmacy Act, 1868, 31 and 32 Vict., cap. 121, £5.

And for amount of penalty incurred by the defendant on April 13, 1889, in taking, using, or exhibiting the name or title of "chemist," contrary to the provisions of the said statute, £5.

Mr. Granger, barrister (instructed by Messrs. Flux, Son and Co., London), appeared for the plaintiffs; Mr. Laxton for the defendant.

In his opening Mr. Granger said the section of the Act under which the plaintiffs proceeded was to the effect that, from and after December 31, 1868, it should be unlawful for any person to sell, or keep an open shop for retailing, dispensing, or compounding poisons, or to assume or use the title "chemist and druggist," or chemist or druggist, unless such person should be a chemist and druggist within the meaning of the Act—that was to say, a duly qualified person, and it was further provided that offenders were liable to a penalty of £5. His contention was that in this instance an attempt had been made to evade the purpose of the Act. The facts were briefly as follows:—A business was some time ago started at 16, Westgate Street, by a man named Thornton, who was a registered chemist, but the labels issued from the establishment were signed in this way, "Edward Thornton, manager; Thomas Eastaway, secretary." What the plaintiffs alleged was that the two men were in reality partners, and that Eastaway kept the shop himself, having actually a share in the business. If that could be established to his Honour's satisfaction, there was no doubt that an offence had been committed. But it would be proved, furthermore, that Thornton died on February 14 of the present year—that before his death he lived at Leavington, and not at Ipswich—that Eastaway had all along carried on the business—as he was still doing—that he paid the rates, although his name was not on the rate-book, and gave notice of appeal upon a question of rating. Moreover he took an assignment of the lease jointly with Thornton, which clearly showed that he was a partner in the concern, and some agreement was subsequently made between the two men, with the terms of which the learned counsel was not acquainted. When the plaintiffs communicated with defendant stating that he had incurred a penalty, they received a letter from the late Mr. Thornton's widow, who asserted that the business was entirely her own, and was carried on by her as executrix under the will of her husband. The widow of a chemist was entitled to this privilege by the 16th section of the Act, if the business were *bonâ fide* conducted by a duly qualified assistant. In this case, however, the defendant was not qualified, and the plaintiffs asserted that he was carrying on a business that he was not entitled to.

Mr. T. W. Stroud, managing clerk to Messrs. Flux, Son and Co., deposed that he went to the shop on April 13 and handed in a prescription to be made up. It was made up accordingly, and he afterwards handed it to Mr. Eastes, assistant analyst to Professor Attfield, who found that it contained a preparation of opium, which is one of the scheduled poisons.

Mr. H. Kerridge, rate-collector for the parish of St. Matthew's, deposed that the Provincial Co-Operative Drug Company were entered as the occupiers of 16, Westgate Street, but that Mr. T. S. Eastaway resided there, and had appealed against the valuation.

Mr. W. Collins, clerk to Mr. Moore, solicitor, London, produced a copy of the assignment of the lease of the premises from the British Tea and Trading Association to Thomas Eastaway and Edward Thornton, "both of Ipswich, in the county of Suffolk, druggists, hereinafter described as the purchasers."

Mr. Laxton, for the defendant, urged that the plaintiffs had given no evidence that the defendant sold the poison in question, the prescription not having been handed to him, nor that he was keeping an open shop for the sale of poison, the offence alleged having taken place twelve months after the date of the assignment put in, and when an entirely different state of things had arisen.

His Honour held that there was sufficient *primâ facie* evidence of both offences. Before Mr. Laxton proceeded with his statement of facts he drew attention to the words in the assignment of the lease, where the property was referred to as "part of the partnership property" of Eastaway and Thornton, described as "druggists."

Mr. Laxton then proceeded with his version of the facts. Mr. Thornton, he said, was a duly qualified chemist; the defendant, on the other hand, had been long connected with the druggist profession, but was not qualified. Some years ago, the two men became intimately acquainted. In 1887 Thornton came back from Australia in bad health; he established this shop in Ipswich, and employed Eastaway as his servant. Under a statute known as Bovill's Act, it was provided that a contract of this kind did not render the agent or servant responsible as a partner, and after the assignment referred to had been prepared, an agreement was actually signed between the two parties in which, *inter alia*, Eastaway entered into an agreement not to sell or dispense any poisons until duly qualified. This clause of the agreement, counsel contended at length, had been strictly adhered to. From the very first a duly qualified practitioner had been employed in the shop; it was he made up the prescription presented by the witness for the plaintiff, and not only had the law been strictly observed in the lifetime of Mr. Thornton, but his widow was at this moment conducting it in the manner specially allowed by the Act—that was to say she was carrying on the business as the executrix of her late husband, and it was conducted by a duly qualified assistant. These were the main lines of a defence argued with much patience and ingenuity, the learned counsel suggesting that the law might have been put in operation by rival chemists.

The defendant and Mr. F. C. Stacey, the qualified assistant who made up the prescription, were then called in support of Mr. Laxton's statement.

His Honour said he did not want to hear Mr. Granger in reply before giving judgment. He held that there was a partnership between Eastaway and Thornton, the arrangement between them being the not uncommon one, that the former should find the brains and the latter the money; that, as a matter of fact, Eastaway was the leading spirit in the business, neither the deceased Mr. Thornton, nor his widow having "carried it on" in the proper meaning of the phrase; and that both offences—the selling of poison, and keeping open shop for the sale of poison—had been committed. Under these circumstances he gave judgment for the plaintiffs for both amounts, allowing costs on the higher scale.

Mr. Laxton asked for leave to appeal.

His Honour, after argument, said he would give leave to appeal if the sum of £50 were paid to meet costs within a week. That would give the defendants' advisers time to consider the matter.—*Local Paper.*

PROSECUTION UNDER THE PHARMACY ACT.

At the Liverpool County Court, on the 10th inst., before his Honour, Judge Shand, a case was heard in which the Council of the Pharmaceutical Society of Great Britain sued David Robert Macdonald for penalties alleged to be incurred on the 31st May, 1889, by defendant selling, or keeping open shop 158, Park-lane, for the retailing, dispensing, or compounding poisons, contrary to the provisions of the Pharmacy Act, 1868; and also on the same date by defendant exhibiting the name or title of "druggist," contrary to the provisions of the same Act. Mr. Hull appeared for the plaintiffs, and the defendant was represented by Mr. Neale.

Mr. Hull explained that for each of the above offences (if proved) defendant was liable to a penalty of £5.

It was alleged on behalf of the plaintiffs that the defendant, whom they contended was the tenant of the premises in question, on May 31, sold a pennyworth of tincture of opium, and that on that date in the shop there was a handbill at the bottom of which was printed, Macdonald and Co., wholesale druggists."

Mr. Neale admitted that the poison had been sold, but not by the defendant, and that the handbill was in existence.

The plaintiffs called a witness to show that the tenancy agreement was in the name of the defendant, but in cross-examination witness admitted that defendant had told him he was only managing the business for Dr. R. H. D. Johnson, of Canning Street, Liverpool. If witness had not been able to get his rent from defendant he should certainly have looked to Dr. Johnson for it. Since the end of May the tenancy agreement had been altered, and it was now made out as between Dr. Johnson, trading as "Macdonald and Co., in Park Lane," and the owners of the property. They only looked on defendant as a nominal tenant.

Mr. Hull put in the Register of Chemists and Druggists, which did not include the name of defendant.

This also was admitted by Mr. Neale, who submitted that there was no case against the defendant.

Mr. Hull reminded the court that they were suing for penalties for keeping open a shop for selling, and for using the name or title "druggist."

David Robert Macdonald, on being called, stated that he managed the business for Dr. Johnson, who paid a salary, ordered all the goods, attended the surgery, and paid for everything. Witness supposed that the doctor traded as Macdonald and Co. because he did not want his name connected with the business. The only way in which the title "druggist" had been used at the place was on the handbill, which was supplied by a firm of pillmakers. Witness when cross-examined, admitted that he had signed "Macdonald and Co." Re-examined, he said he only signed that name by the instruction of Dr. Johnson.

In the course of his evidence, Dr. Johnson stated that the business in Park-lane was his, and he used the title Macdonald and Co. because as a practising physician in Liverpool he did not wish his name associated with a trade.

The Judge: Is it a usual thing for a surgeon to carry on a business?—I think surgeons carry on a great many businesses?

That is not the question—is it a usual thing?—It is not very usual, but it has been done, and is being done.

Is it within the Act?—Yes.

The Judge: Did you think it a right thing to carry on this business under this title?—Decidedly so.

Mr. Neale said that whatever fault Dr. Johnson might have been guilty of it would not apply to the defendant.

The Judge said that he took the Act to mean that any person selling a poison must be a qualified chemist. A person should not have an assistant selling a dangerous thing—perhaps a lad of 15 selling a poison which might kill a dozen people.

Mr. Neale: I do not think that was ever intended.

The Judge: I do; I think that is the reading of the section, and if that is so this man must be liable, for it is admitted that he is not a chemist.

At the conclusion of the case, his Honour said that he would find against defendant on every possible point he could. It was an evasion of the Act. Defendant must pay the penalties claimed—£5 in each of the two cases—as he (the Judge) found that he had sold poison without being a registered druggist, and that he had exhibited the title "druggist" in the place. Costs were granted on the higher scale.

Mr. Neale gave notice of appeal.—*Local Paper.*

Review.

A HANDBOOK OF CRYPTOGAMIC BOTANY. By ALFRED W. BENNETT and GEO. MURRAY.*

This book is an endeavour by the authors to supply what has long been greatly in demand by the English student, a fairly concise and yet complete account of the most recent results of the labours of the various workers in the department of cryptogamic botany. The works that have hitherto been at his disposal have been either translations of well-known German handbooks, or not very recent books on the classification of these lower forms. The former have been written too exclusively on the lines of morphology and anatomy, while the others, ignoring this side of the science, have tended to be somewhat dry catalogues of genera and species. In the book before us the authors have endeavoured to avoid the exclusiveness which characterises each of these methods of treatment, and have presented us with a cryptogamic flora which, while giving us fairly complete accounts of the genera, and the lines of classification on which these are arranged, yet deals with the general problems of their life history and does not neglect their anatomical and histological peculiarities. Thus it is evidently the wish of the authors to introduce the student to both departments of botany, the biological and the systematic, while they are careful to state at the outset that they do not wish to supersede any of the special monographs which have appeared of special families or groups. In this desire they have succeeded, giving sufficient information on the different heads to lead the student easily to the more advanced and more detailed text-books, while helping the more general reader to understand the structure and life history of numerous forms.

Naturally in such a work as this the greater space is occupied with the description of the lower forms, these showing so much more variety of structure and appearance than the higher ones, the Vascular Cryptogams, in which there are but few genera and species. The amount of detail given in dealing with the algæ and the fungi is unavoidable, on account not only of the immense number of the forms known, but also of the much less complete character of our knowledge of them and of their life histories.

The lines of classification which the authors have followed will perhaps invite some discussion. In the higher forms they adopt as their primary division the occurrence of two kinds of spore in the plant, or of one only, grouping the Rhizocarps, the Selaginellas and Isoetes as their first division, and putting the club mosses, ferns and horsetails as a second section. There is much to be said in favour of this course, as the lines of development lead up through such a series to the higher forms, the gymnosperms and the flowering plants. It seems on the other hand to do violence to undoubted affinities, removing Lycopodium to some distance from Selaginella, and treating similarly the Rhizocarps and the Ferns, which have so much in common.

* London: Longmans, Green and Co., 1889. 8vo. Pp. 1-473. 16s.

In the classification of the Thallophytes the authors with much reason decline to follow the order proposed some years ago by Sachs, and followed in his text-books ; a classification starting with the idea of two parallel series of forms, one with chlorophyll, the other without it, and proceeding in each series entirely on the lines of the reproductive organs. This system, which has held its own for some years, does considerable violence to vegetative affinities, and demands for its vindication the acceptance of the idea of the derivation of fungal from algal forms all along the line. A much better line is taken in the present work, not, indeed, for the first time, a line which recognizes the importance of using vegetative rather than reproductive characters as giving the most consistent foundation for classification. The reasons for this mode of treatment of the subject are set forth with some vigour in the work. The line adopted is to start with the very lowest forms and to make of these a primary class,—the *Protophyta*,—comprising about the same forms as the class called by Sachs by the same name. Above these forms the first separation is into the Algæ and the Fungi, each of these again being subdivided on lines which place their reproductive systems in a position subordinate to their general structure and habits of life.

Departing somewhat from the mode of treatment of the subject by most authors they place the Characeæ outside the limits of the Thallophytes, giving them the position of a group intermediate between these and the moss-like plants.

In commencing the discussion of the life history of the various forms the authors call attention to what is a real stumbling block in the path of many students when they commence the study of these organisms, the confusing terminology in vogue, particularly the loose way in which the term *spore* is employed, and they suggest certain limitations of the term which seem to be highly desirable. They wish to use the word only when reference is made to a reproductive cell asexually produced. If this could be universally adopted it would do much towards clearing away a good deal of obscurity which comes over the mind of the learner on first becoming acquainted with these bodies. He finds that in very lowly organisms a form of reproductive cell occurs, which having the power of movement and showing outward signs of life, is called a *zoospore*. He finds in a higher form a reproductive body which has none of these outward peculiarities, and yet is known as an *oospore*. Again, he finds a third structure, differing from both these, and called simply a *spore*. It is not to be wondered at, therefore, that he concludes all these forms to be morphologically equivalent to one another, and hence confusion reigns in his mind. The habit of using the term *spore* as equivalent to *reproductive cell*, and limiting its exact meaning by a prefix, has grown to such a point that it is well that its inconvenience should be pointed out. The authors prefer the term *oosperm* to *oospore* for the body produced sexually, reserving the word spore, both alone and in combination, for reproductive cells produced asexually.

Their efforts to amend the nomenclature of the science are not, however, so uniformly successful as in this instance. While decrying the tendency to introduce new terminology so freely indulged in by many writers, they are themselves responsible for an effort to amend terms now in constant use and well understood, by anglicising the Latin forms under which they are known; an effort which serves no practical purpose, and which only makes the terminology clumsy and etymologically bad by tacking an English plural form on to a modified Latin or Greek singular. Thus *antheridium* becomes *antherid*, and its plural *antheridia* appears as *antherids*. So also *paraphysis* becomes *paraphyse*, *columella*, *columel*, *calyptra*, *calypter*. These changes seem hardly likely to be adopted permanently, conveying no better meaning than the recognized forms, and being unjustifiable on etymological grounds. The word *archesporium*, anglicized in this way, becomes *archespore*, and in this form transgresses the limits of application of the term *spore* already alluded to.

In treating of the questions of morphology the authors are in the main successful, though they display in one particular a caution which leads them up to if not over the verge of inaccuracy. The homologies of the reproductive organs are fairly stated throughout the groups of the vascular cryptogams, but they are not followed up into the higher forms of the gymnosperms and angiosperms, so far as the oophore generation is concerned. The authors in particular shrink from the task of stating decisively what in the latter forms are the homologues of the prothallium. Thus, on p. 12, we find, "The contents of the pollen grain of the angiosperms . . . . . are homologous with the antherid of the cryptogams," while on p. 15 it is stated, "In angiosperms the antherids have completely disappeared." Rather than argue the homologies out on first principles, we find them taking refuge in such statements as "the suppression of the sexual generation or prothallium with its antherids and archigones" (p. 15) and "alternation of generations diappears," the latter assertion being made equally of the Characeæ and of the phanerogams. A curious instance of this caution and its results is seen also in the description of the reproduction of the Rhizocarps, where we are told (p. 23) "the microspores do not give birth to a male prothallium," while on p. 27 the prothallium, though said to be reduced to a rudiment, is yet described. A similarly contradictory statement is made about the roots of Salvinia (cf. p. 17 and p. 28).

The work, apart from certain peculiarities of this kind, is calculated to supply a felt want, and will, doubtless, hold its own in the literature of the subject. An especially good feature about it is the summary of the literature of the separate sections which is found at the end of the several chapters. It is curious, however, that the literature quoted of the Characeæ takes no account of Vines's papers on the morphology of these forms, published in the *Journal of Botany*.

The work is well illustrated, figures of the chief forms being collected from various sources and happily inserted with the text.

ANSWERS TO CORRESPONDENTS.

A Formula Wanted.—W. Lawson asks for "Crevat's formula for calculating the food of animals from the body weight." Can any reader supply it ?

J. W. D. Hume.—Your seven questions as to the reactions between various salts do not allow of answers within the proper limits of this column ; but the information can be found in any fairly good manual of qualitative analysis.

A. E. Beard.—(1) *Triticum pungens.* (2) *Pimpinella saxifraga.* (3) *Chenopodium album.* (4) *Scirpus maritimus.* (5) *Vicia sativa*, var. (6) *Lepidium Draba.* (8) *Chœrophyllum temulentum.* (9) *Heracleum Sphondylium.* (11) *Holcus lanatus.* (12) *Astragalus glycophyllos.* (13) *Thalictrum minus*, probably ; no flowers sent. (14) *Alchemilla vulgaris.* Please confine yourself to six specimens in future.

W. F. Cowpe.—We are of opinion that you would be eligible ; but write and state the case to the Secretary.

W. H. Bulley.—Correct answers to the questions in arithmetic in the Preliminary examination are not supplied officially, and we know of no way of obtaining the answers other than by working out the sums.

M. D. C.—The examination is supposed to cover only an elementary knowledge of such points as would be comprised in any good manuals on the subject. See the questions in last week's Journal.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Maiden, Clague, Umney, Johnston, Brighouse, Thompson, T. W. W., J. R.

"THE MONTH."

Methacetin.

A few months since reference was made in these columns (April 27, p. 861) to a compound that had been reported upon favourably as an antipyretic and antineuralgic, and which from its analogy to phenacetin had been named "methacetin." The relation of these compounds to each other is easily apparent on comparison of the formula by which they are represented, from which it appears that methacetin differs from phenacetin in containing a methyl group in the place of an ethyl group—

$$C_6H_4\begin{cases} O\cdot C_2H_5 & (1) \\ NH\cdot C_2H_3O & (4) \end{cases} \qquad C_6H_4\begin{cases} O\cdot CH_3 & (1) \\ NH\cdot C_2H_3O & (4) \end{cases}$$

Phenacetin. Methacetin.

If the comparison be extended to antifebrin, it may be stated that antifebrin is acetanilid, phenacetin is oxyethylacetanilid, and methacetin is oxymethylacetanilid. Methacetin is now stated (*Pharm. Zeit.*, July 10, p. 419) to crystallize in shining white odourless and almost tasteless scales, melting at 127 C., and boiling undecomposed above that temperature. It is soluble in 526 parts of water at 15° and 12 parts at 100°, whilst phenacetin requires 2500 parts of water at 15° and 86 parts at 100°; it follows therefore that the solubility of methacetin in water is five times as great as that of phenacetin. In alcohol and acetone methacetin dissolves very freely, and also in chloroform, especially when warmed. It is less soluble in benzol and only difficultly soluble in carbon bisulphide, petroleum, benzine and ether. Upon cooling or evaporation of a solution the methacetin separates unaltered in handsome crystals. It is also freely soluble in glycerine and fixed oils, especially when heated, and with more difficulty in turpentine and other essential oils. An aqueous solution is neutral in reaction and should not be affected by barium chloride, silver solution or ammonium sulphide. Heated on platinum foil it should burn without leaving any residue. In most of its known chemical reactions it resembles phenacetin, from which it is best distinguished by its physical properties. For instance, if methacetin be heated with insufficient water for its solution it melts and solidifies again upon cooling, but phenacetin heated with the same quantity of water does not melt. In respect to the therapeutic value of methacetin Dr. Weller corroborates what has been previously stated, and says that in its action it corresponds in every respect with phenacetin.

Hydracetin in Psoriasis.

It will be remembered that in a recent notice of hydracetin, the purified representative of "pyrodin," it was mentioned that Dr. Guttmann had reported that he had used a 10 per cent. ointment of it successfully in the treatment of psoriasis. (*Pharm. Journ.*, June 29, p. 1049). More recently Dr. Oestreicher also reports that he has used a 20 per cent. lanolin ointment of hydracetin with the best results (*Apot.-Zeit.*, July 20, p. 763); but he qualifies this statement by the important observation that in every case after using the ointment from seven to ten times severe symptoms of poisoning were set up. The patients complained of constantly increasing exhaustion and weakness in the limbs, accompanied by the impression that a serious illness was impending. The urine was of a mahogany colour, with a greenish tinge, but no biliary colouring matter could be detected in it. Dr. Oestreicher is therefore of opinion that a substance that is capable of producing such symptoms requires to be subjected to more prolonged clinical observation as to the necessary limits of doses before it should be recommended for general medicinal use.

Antipyrin Incompatibles.

A short time since M. Carles called attention to a precipitate which is formed upon mixing solutions of antipyrin and extract of cinchona. M. Ollivier, who has been making further experiments, says (*Bull. Comm.*, June, p. 278) that all the active principles are precipitated together, and that there remain in the liquid hardly any perceptible traces of alkaloids or antipyrin. According to M. Carles, however, the precipitate is readily soluble in weak acids, so that it might dissolve in the gastric juice, and the mixture, though unsightly, might not be inert. Another apparent incompatibility has been recorded by M. Blainville (*l.c.*), who having occasion to mix 4 grams of antipyrin and 5 grams of chloral hydrate in 15 grams of water, observed that the mixture assumed a milky appearance, and upon clearing deposited an oleaginous liquid. After decantation this liquid soon crystallized, and then no longer possessed the taste of antipyrin or of chloral, but a flavour rather resembling that of coriander seeds. Attention is called to the inconvenience that may result from the prescribing of complex substances of which so little is known together with other chemical substances that may change their physiological action altogether, and it is recommended that as far as possible, when ordering them, simple formulæ in which only distilled water and a simple flavouring agent enter should be adopted.

Orange-Flower Water Coloration.

Some correspondence has appeared recently in a French contemporary journal as to the cause of a red coloration observed when a mixture containing "antimoine diaphorétique" (acid antimoniate of potassium), glycerine and orange-flower water was heated in a water-bath, in compliance with instructions, before being taken by the patient. One correspondent affirmed it was due to a defect in the orange-flower water, on the ground that the colour was not observed upon repeating the experiment with a genuine distilled water (*Bull. Com.*, June, p. 280). Another recalled the known action of nitric acid upon orange-flower water, and stated that commercial "antimoine diaphorétique" always contains a small quantity of potassium nitrate, which under the influence of heat might react with the acid antimoniate, with the formation of neutral antimoniate of potassium and liberation of nitric acid. It was ascertained that a similar reaction takes place when acid sulphates and acid tartrates are added to solutions of nitrates in orange-flower water, without the intervention of the glycerine. Further it was suggested that the diaphoretic antimony might contain a little basic nitrate of antimony, which would be decomposed by the action of water. Finally a more systematic series of experiments seemed to demonstrate that each of the three ingredients is concerned in the reaction. It was found that when distilled water holding in suspension acid potassium antimoniate is boiled it remains perfectly neutral, but that when neutral glycerine is used instead of water the liquid becomes slightly acid. Neutral orange-flower water also becomes slightly acid under the same

conditions, without becoming coloured ; but upon glycerine being added it sinks to the bottom and a rose coloration is produced at the point of contact of the two liquids, whilst the reaction of the mixture becomes more distinctly acid. When orange-flower water is heated with a trace of nitric acid it acquires a faint rose colour, which is not changed by the addition of glycerine, but on adding the antimony salt the colour becomes much more intense. The rose colour so produced is changed to a dirty yellow by a few drops of soda solution and restored by nitric acid. It will be remembered that the coloration of a mixture containing nitrohydrochloric acid and orange-flower water was brought under the notice of the Pharmaceutical Conference by Messrs. Reynolds and Bothamley in 1878 (*Pharm. Journ.*, [3], ix., 248).

Rubidium-Ammonium Bromide.

It having been noticed by Professor Laufenauer that the activity of the bromides ordinarily used in medicine is proportional to their atomic weight,—potassium bromide, for instance, being much more energetic than lithium bromide,—he was induced by this observation to experiment with a bromine compound of much higher atomic weight, rubidium-ammonium bromide being selected for the purpose. He reports (*Mün. med. Woch.*, July 9, p. 495) that he has administered it to twenty-two patients, seventeen of whom were epileptic. Generally speaking, the action corresponded with that of potassium bromide ; but in six cases the results obtained were undoubtedly more favourable than when using any other bromine preparation. The quantity given amounted on the average to 6 grams daily. The compound was also administered with good results as a sedative and hypnotic in evening doses of 4 to 5 grams. Rubidium-ammonium bromide is, however, rather an expensive remedy.

Camphor Compounds.

The compounds formed by camphor with chloral, phenol, betol, salol, resorcin and other substances have attracted some attention in recent years in consequence of the introduction of some of them into medicine. Most of them present the peculiarity of being liquid products of the combination of two solids, and even when this is not the case, as in the compounds of camphor with hydroquinone, salicylic acid, tannin and gallic acid, the temperature of the melting point of the joint product is much below that of either of its constituents (*Répertoire*, July 10, p. 289). M. Cazeneuve points out that these camphor compounds are probably more numerous than is generally supposed (*Journ. Pharm. Chim.*, July 15, p. 49). Even resin and gum resins are said to soften in contact with camphor, and gutta percha has been reported to behave similarly. Although in many of these cases true compounds are probably formed, in which the individual properties of the constituents are modified, the exact nature of the combination has not yet been explained and it is evident that it is comparatively feeble. It is known, for instance, that upon submitting to distillation the liquid formed by the combination of camphor with chloral hydrate, it is split up into its constituents. The same result is obtained by simply shaking it with water; but it remains unaltered when agitated with an aqueous solution of chloral hydrate. In discussing the question, M. Cazeneuve expresses the opinion that the formation of these compounds is not due to the non-saturation of the camphor molecule, which allows of the fixation of two atoms of hydrogen, to form borneol, because the compound so produced is a stable one. He prefers to consider camphor-chloral and its congeners as a class of "molecular compounds," in which the combination between the two constituents is comparable to that which exists between water of crystallization and a salt.

Naphtol-Camphor and Salol-Camphor.

The valuable properties of the compounds of camphor with carbolic acid and with salol form the subject of a communication by M. Désesquelle (*Répertoire*, May 10, p. 200). In hospital use they have been found to possess considerable antiseptic properties, and the application of the naphtol-camphor is not followed by pain, in consequence of the anæsthetic action of the camphor. In preparing them M. Désesquelle finds the most convenient proportions to be 200 parts of camphor to 100 parts of β-naphtol or 300 parts of salol. The two ingredients are reduced together to a fine powder, and then gently warmed until liquefaction is complete ; the liquid is then filtered and preserved in a well-closed bottle. The liquids obtained are denser than water, in which they are insoluble, and miscible with fixed and volatile oils, ether, and alcohol. They also possess considerable solvent powers, 10 parts of iodine, for instance, being soluble in the cold in 90 parts of naphtol-camphor. Cocaine hydrochlorate and the cinchona alkaloids also dissolve in them in considerable proportions. Lastly, the liquids are said to constitute an excellent medium for keeping surgical instruments, as they attack neither the metal nor the wood.

Iodoform and Silver Nitrate.

The consequences of an accident by which two contiguous bottles, one containing iodoform and the other silver nitrate, were broken in a box during transit and the contents mixed, are the subject of an editorial caution to packers (*Amer. Drug.*, June, p. 119). The occurrence of the breakage first became manifest by the escape of suffocating red fumes through the chinks and cracks of the box, when those in charge, fearing the box would take fire, drenched it with water. Of course everything in the box was spoilt and the corrosive liquor draining from it did considerable mischief. It is pointed out that the reaction between these two substances in the dry state differs widely from that which takes place in the presence of water. If iodoform be triturated gradually with solution of silver nitrate there is no violent reaction, and the whole of the constituent not in excess is decomposed according to the equation :—

$$CHI_3 + 3AgNO_3 + H_2O = 3AgI + 3HNO_3 + CO.$$

But when iodoform and silver nitrate come into contact in the dry condition, or perhaps with only a trace of moisture, a reaction is set up which rapidly intensifies and passes off almost like an explosion. The decomposition in this case is represented by the equation :—

$$CHI_3 + 3AgNO_3 = 3AgI + HNO_3 + N_2O_4 + CO_2.$$

Petroleum Soap.

The manufacture of the petroleum soaps of commerce appears to be based upon the observation that when petroleum in certain proportion is dissolved with the aid of heat in melissic alcohol a solution is obtained which when added to an aqueous solution of soap forms a stable homogeneous liquid. In practice carnauba wax, which contains melissic

alcohol, is used. Working upon these lines, M. Emery has prepared a soap for medicinal purposes containing about one-fourth of its weight of petroleum and using ordinary white wax instead of carnauba wax (*Répertoire*, May 10, p. 205). The method adopted is to heat together 50 parts of petroleum, 40 parts of white wax and 50 parts of 90 per cent. alcohol until solution is complete, then add 100 parts of Marseilles soap, and when this is dissolved agitate until the mixture assumes a creamy consistence, when it is run into moulds. The soap so obtained is described as being homogeneous and firm, emulsifying well, especially with hot water, and as being an excellent medium for applying the insecticidal properties of petroleum to the skin.

Altered Essential Oils.

According to the *Pharmaceutical Post* (June 16, p. 407) an old resinified and malodorous essential oil is best freed from impurities by shaking it for a quarter of an hour with a thin paste made of powdered borax, bone black and water and then filtering, when the oil passes through quickly and bright. To decolorize an oil it should be distilled with an equal weight of poppy oil and saturated solution of common salt, when it is said the oil passes over colourless to the last drop, whilst all the colouring matter remains combined with the fixed oil.

Vaselin and Water.

According to M. Klebs, of Brussels (*Journ. de Pharmacol.*, June, p. 243), the inconvenience sometimes experienced in dispensing through the immiscibility of vaselin and water may be overcome by the aid of castor oil. The addition of this oil in the proportion of two drops to a gram of liquid he has found to be sufficient to produce a perfectly homogeneous mixture. By this means potassium iodide may be introduced into an unguent without danger of the decomposition that takes place after a time when fat is used.

Menthol and Safrol.

Menthol is well known to act as an anæsthetic when applied externally, but its internal use as an anæsthetic and antiseptic does not appear to be so generally recognized. Dana states that in doses of five to twenty grains it gives a pleasant feeling of warmth, stimulates the cardiac action without increasing its rapidity, and raises the arterial blood pressure. He also recommends it in preference to antipyrin for weakly and anæmic individuals, to whom the administration of antipyrin is not without danger, owing to its tendency to cause collapse. It is in the headaches of neurasthenic and anæmic individuals that menthol has been found especially valuable, as well as in migraine and supra-orbital neuralgia. To its virtues as an antiseptic the writer can bear witness, five to twenty grains proving generally sufficient to stop the diarrhœa of abdominal catarrh when the bile duct is obstructed and the bile does not enter the intestine. Safrol is stated to possess similar anodyne effects in doses of twenty drops, given for headache and sciatica (*Brit. Med. Journ.*, p. 1419).

Peptones and Nutrition.

Peptone being presumed to be the end-product of gastric digestion, it has usually been considered to represent the form in which the proteids are absorbed, and with this idea numerous commercial "peptones" have been recommended for patients suffering from weak digestion. But the idea that proteids are absorbed as peptone to any great extent has been disputed and the relation of the peptones to nutrition is discussed in an interesting paper in the *British Medical Journal* (July 20, p. 136). The conclusion arrived at is that the weight of accurate evidence is in favour of peptones having a great nutritive value, and of their representing, in fact, the modifications in which proteid food is absorbed in the stomach and intestine. But a question then arises as to what becomes of the peptones, since there is a concurrence of opinion that they are not present as such in the blood and lymphatic vessels in sufficient quantity to account for the proteids taken in as food. Hofmeister appears to have lighted upon a possible explanation in the observation that peptones probably undergo a change in traversing the wall of the living intestine. During digestion peptones are found in quantity in the mucous membrane itself, but not deeper down in the intestinal wall, and when a piece of intestine taken from an animal killed while in full digestion was kept at a body temperature the peptones disappeared. Presumably the conversion that takes place is into serum albumen, and this theory finds support in the results of some experiments conducted by two ladies in the laboratory at Berne. It is known that a frog's heart may be separated from the body and kept pulsating for many hours if a proper nutrient liquid be supplied to it, one of the best being a 0·6 per cent. salt solution, to which a certain proportion of serum has been added. If salt solution alone be used, the pulsation quickly stops, and nearly the same result follows when peptone is added to the salt solution instead of serum. But Miss Popoff found that if a solution of pepsin-peptone be placed in the stomach of a living dog for twenty minutes and then removed, it undergoes a change, and becomes capable of sustaining the pulsation of a frog's heart, the change being more marked when the solution is placed in the small intestine. Pancreas-peptone, however, similarly treated, behaves differently, and does not act as a nutrient liquid for the heart after exposure to the action of the intestinal canal. The effect on the pepsin-peptone seems to be produced by epithelial cells lining the stomach and intestines, and Miss Brinck found that a solution passed a few times through the heart becomes capable of sustaining cardiac action. It was also found that pepsin-peptone solution in incipient decomposition is a powerful sustainer of the heart's action, but after the decomposition has progressed it becomes a cardiac poison. Miss Brinck suggests that the first effect is due to an organism, which she describes as *Micrococcus restituens*, forming serum albumen from the peptone, and that subsequently another organism that secretes a poison is developed in the liquid.

Milk.

In a recent communication to the Paris Chemical Society, M. Béchamp gave an interesting account of his researches into the constitution of cow's, ass's and woman's milk (*Chem. Zeit.*, June 29, p. 853). In a former paper (*Pharm. Journ.*, [3], xix., 427) the author had given reasons for holding that butter is not present in milk as a simple emulsion, but that the fat globules are actually contained in closed cells, surrounded by a membrane of an albumenoid nature, insoluble in dilute alkalies. The fact that butter can be removed

from milk by shaking it with ether, which has been considered evidence of the emulsification theory, he explains by saying that under the conditions the delicate enclosing membrane is ruptured and a true churning takes place. But if the milk be mixed with an equal volume of ether in such a way that no froth results and the mixture be allowed to stand until a separation of the liquids takes place, the fat globules, which occur in the milk underlying the ether, are seen to have considerably increased in size and altered in appearance. For several days it is found that the volume of the milk layer goes on increasing and that of the ether layer decreasing, which is just the reverse of what might be expected to occur if the fat were dissolved in the ether. Simultaneously the milk separates into two layers, a cream layer, containing ether, which has lost the appearance of milk, and in which swollen globules are perceptible for some time, and a lower layer. The thickness of the upper of these two layers stands in certain relations to the richness of the milk in butter, being least in ass's milk, which is the poorest in fat. The consistency also varies, being greatest in ass's milk and least in woman's milk. The lower layer also, in the cases of cow's, goat's and ass's milk, shows varying degrees of opacity and milkiness, but woman's milk gives an almost transparent lower layer, and can be distinguished from the other three milks mentioned by this character.

Milk Souring.

Notwithstanding all the attention that has been paid to the common phenomenon of the souring of milk, considerable uncertainty seems still to exist as to the causes leading to it, whether it is due to the action of one specific organism or of more, or even to other agents. Some recent experiments by Herr Fokker have led him to the conclusion that the milk-souring germ is a modification of an ordinary saprophyte, but that the *rôle* played by the germ is a very subsidiary one (*Med. Chron.*, July, p. 291). This appeared to be shown by the fact that the acidity developed two days after the addition of one drop of a pure culture of the milk germ to 50 c.c. of sterilized milk was almost equal to that observed when 50 drops were added. But when casein was substituted for the germ culture, the acidity increased with the quantity of casein added. Nevertheless, the acidification was not in strict proportion with the augmentation of the casein, and this is attributed to the increased concentration of the liquid. It is interesting to note that Liebig attributed the acidification of milk to the agency of casein, but Pasteur demonstrated that the presence of a living organism was necessary, and looked upon casein as its food. The manner of action of casein is not clear, for this seems to be intensified after the casein has been subjected to a steam heat under pressure, and the acidifying property is also shared by coagulated albumen. The idea of the action being mechanical, and dependent like that of platinum sponge upon porosity, is excluded by experience with other substances. Herr Fokker appears to think it dependent upon a "power of furthering the production of acid" peculiar to animal substances, and to look upon the work of the germ as the "spark that kindles the firework."

Dr. Hanausek calls attention to the occurrence in commerce of "artificial cloves" made of moulded paste (*Apot.-Zeit.*, June 29, p. 691). The resemblance of the spurious article to cloves is said to be sufficiently close to allow of their being overlooked in the mass; the colour approaches closely to that of the real article, but when examined more closely ridges from the mould are perceptible and there is an adherent dust that is yellow, consequently much lighter than the clove. In the mouth the spurious "cloves" soften to a gritty paste, colouring the saliva brown, and tasting slightly of cloves, with a remarkable "bark" flavour. When pulverized and the powder examined microscopically a very minute proportion of clove tissue was found. But the conclusion arrived at was that the spurious "cloves" are made from a paste consisting mainly of wheaten flower and ground oak bark, with a small proportion of genuine cloves powder, pressed into metal moulds and roasted.

"Artificial" Cloves.

The property possessed by aniline in acid solution of colouring the sclerous elements of vegetable tissues yellow, without affecting other tissues, is utilized by M. Chevreau as a means of detecting an adulteration of pepper with ground olive stones (*Répertoire*, May 10, p. 203). For this purpose he uses a solution of one part of aniline in two or three parts of ordinary acetic acid. If a sample of genuine pepper powder be moistened with this solution it undergoes no change perceptible to the naked eye, and with the aid of a microscope only a few scattered yellow cells can be seen. But if the sample contains ground olive stones it assumes a characteristic yellow aspect, and the stone cells, coloured a pure gamboge yellow, can be easily seen. The shade of colour varies with the extent of the admixture and may be used as an indication of the quantity of adulterant present.

Olive Stones in Pepper.

The *Midland Naturalist* (p. 154) contains an account of a granite found in Devonshire, at Meldon Quarry, near Oakhampton, which contains 0·7 per cent. of lithia. It contains, besides, 3 per cent. of potash, 4·6 per cent. of soda, 16 per cent. alumina, 1 per cent. ferric oxide, 0·2 per cent. of magnesia and manganese oxide, 0·9 per cent. lime and 72·4 per cent. of silica. The lithia was separated in the form of chloride by Gooch's method of using boiling amyl alcohol. The granite is almost pure white, somewhat resembling statuary marble in appearance, and is composed of quartz, felspar (largely plagioclase), white mica, topaz, and green tourmaline; black mica is absent. The lithia appears to occur in the white mica. Lepidolite had previously been noted among the constituents of Cornish granite, and lithia is widely diffused among granitic micas from all parts of the kingdom, but except one Scotch muscovite granite this appears to be the only British sample that contains sufficient lithia to colour a flame so as to be visible without a spectroscope. Lithium chloride has, however, been found to the extent of 26 grains to the gallon in a spring in Clifford United Mines, Cornwall.

Lithia in Granite.

A new type of calcareous cystolith has been detected by Mr. E. Heckel in the stem of *Exostemma floribundum*, which may serve as a means of distinguishing it from *E. caribbæum*, in which these bodies are quite absent. In the bast layers of the cortical parenchyma two concentric cycles of cystolithic

Exostemma floribundum.

cells are found. The cystoliths are in the form of papillæ, terminating in a point, and are five or six in number; the apices are all turned towards the interior of the cortex and their bases towards the exterior. When dissolved by weak acid a small pedicel of cellulose remains on the wall to which the cystoliths have been attached, thus differing from those of *Urticaceæ*.

Structure of Plant Hairs.

The structure of the hairs of various species of *Urticaceæ*, *Moraceæ*, *Boraginaceæ* and *Cucurbitaceæ*, remarkable for their rigid character, has been investigated by Dr. F. G. Kohl. He finds that they exhibit a marked thickening at the apex followed by a partial calcification or silicification. This thickening is due to the deposit of caps of cellulose placed one within the other, masses of protoplasm lying between each. This structure is easily seen in the hairs of *Symphytum officinale*, after the calcium carbonate has been removed by dilute hydrochloric acid. It is to the deposits of lime or silica that the brittleness of such hairs is due, and that they so readily, as in the case of the nettle, enter the skin, and being brittle break off and allow the poison to enter (*Journ. Roy. Micr. Soc.*, p. 403).

Primula obconica.

The favourite greenhouse plant, *Primula obconica*, appears to possess either irritant or poisonous properties which render it as unsafe to handle as the poison oak (*Rhus Toxicodendron*). Attention was called to this property of the plant by a writer in the *Garden and Forest* some months since, and the statement has been confirmed by others in the *Garden* (April 20, p. 368, and July 13, p. 35). It would appear, however, that it is only certain individuals with an abnormally sensitive skin who are thus affected, shown by the fact that one of the persons also experienced irritation from contact with the fruits of *Acer macrophyllum* and *Ostrya virginica*, which are covered with minute hairs. In some cases troublesome inflammation of the face and hands resulted from the handling of the *Primula obconica*. It does not appear to have been ascertained as yet whether the irritation is due to hairs, or to a volatile acrid principle, as in the Anacardiaceæ. The unbranched jointed hairs themselves are apparently not adapted for causing mechanical irritation, having somewhat obtuse apices. They appear to secrete, however, a viscid yellowish substance, which is found coating their apices. The leaf, when chewed, leaves a tingling or acrid sensation on the tongue.

Blue Colour of Flowers.

The blue colour of most flowers is well known to fade rapidly, and this is due, according to Herr H. Molisch, to the fact that anthocyan (or the mixture of pigments known under that name) in purple leaves or petals is readily turned blue by a little alkali, green by a larger quantity, and then yellow, finally losing its colour altogether. In the state of nature this change is brought about by the contents of the cells containing anthocyan becoming mixed with the protoplasm of other cells from which they were previously separated.

Tannin in Plants.

According to Herr Klercker, tannin in mature roots occurs partly dissolved in the sap and partly in special cavities, or tannin vacuoles, occasionally in the cell wall, but never in the protoplasm. He believes that the vacuoles are probably separated from the protoplasm by a precipitated membrane of iron tannate. He regards the tannin of the vacuoles in the root bark as an excretion, although in the epiderm a resorption of the vacuoles frequently takes place in the formation of root hairs. The tannin was recognized in the experiments made by staining with methyl blue and an alcoholic solution of cupric acetate, which stains the tannin and fixes the entire cell contents.

Structure of the Petiole of Dicotyledons.

Mr. L. Petit has investigated the anatomy of nearly five hundred species of Dicotyledons, belonging to forty-eight families and three hundred genera, and has obtained results which will probably be of great value for purposes of identification of leaves under the microscope. He divides the petioles into two primary divisions. In the first, including *Umbelliferæ*, *Araliaceæ*, *Malvaceæ*, *Tiliaceæ*, *Sterculiaceæ* and *Compositæ* the terminal section in the petiole encloses secretory canals. In *Umbelliferæ* and *Araliaceæ* the canal lies behind each peripheral bundle, while the others have them arranged irregularly. In the second division, the terminal section of the petiole does not enclose secretory canals. This section includes *Apocynaceæ*, *Asclepiadaceæ*, *Convolvulaceæ*, *Solanaceæ*, *Myrtaceæ* and *Cucurbitaceæ*, with bicollateral bundles, and various *Rosaceæ*, *Malvaceæ*, *Geraniaceæ*, *Oxalideæ*, *Cupuliferæ*, *Amaranthaceæ*, *Chenopodiaceæ* and *Leguminosæ*, without any collateral bundles. In *Scrophulariaceæ*, *Oleaceæ* and *Boraginaceæ* the lower bundle preponderates and there is no sclerenchyma. *Papaveraceæ*, like *Compositæ*, has secretory tissue, but unlike the latter has no sclerenchymatous fibres. *Cruciferæ* have thick fibres like *Compositæ*, but no secretory tissue. In *Ranunculaceæ* the transverse section of the fibrovascular bundles has the form of an ellipse (*Journ. Roy. Micr. Soc.*, 1889, p. 409).

Sideroxylon dulcificum.

At a recent meeting of the Linnean Society, a specimen of the fruit of *Sideroxylon dulcificum*, the so-called "miraculous berry" of West Africa, was exhibited by Mr. D. Morris, the Assistant-Director of Kew Gardens. He stated that the sweet pulp of the fruit, which is about the size of an olive, imparts to the palate a sensation which renders it possible to partake of sour substances, such as tartaric acid, lime juice and vinegar, and gives them a flavour of absolute sweetness. The fruit of another plant (*Thaumatococcus* (*Phrynium*) *Danielli*) possessing similar properties, was also shown, living plants of both having been recently received at Kew from Lagos from Governor Moloney. These two vegetable curiosities are, however, by no means new, the former having been described and figured in the *Pharmaceutical Journal*, [1], vol xi., p. 447, and the second in vol. xiv., p. 159, of the same publication. The former also is mentioned by Dalzell in his history of Dahomey, where it is stated to be used by the natives to render palatable a gruel made from bread after it has become too stale for any other purpose. Unfortunately the peculiar sweetening principle is soon dissipated if the fruit remains ripe for any length of time. Preservation in spirit, acetic acid or syrup, does not appear to favour the retention of the dulcifying principle, according to Dr. Daniell, since he found that specimens of the fruit brought to England became insipid and lost their properties. In the case of *Thaumatococcus Danielli*, however,

the properties of the mucilage surrounding the seeds appears to be retained much longer when the fruits are preserved in syrup. It would be interesting to ascertain the nature of the sweet substance contained in the fruits, and it may be hoped that the Kew authorities will not let so interesting a question fall to the ground without some attempts being made in various ways, such as obtaining the dried unripe fruits, to extract the dulcifying principle of these fruits.

LAC FERMENTATUM.*

A. *Kumyss* (National Formulary, U.S.P.).

BY AD. TSCHEPPE, PH.D.

Kumyss is generally designated as fermented milk. As this term implies the meaning of alcoholic fermentation, the definition is incorrect, since lactic fermentation has as much share in shaping the final result, by acting on both the proteid substances and the sugar, as vinous fermentation does. It is not even the sugar contained in milk which is attacked by the ferment which induces alcoholic fermentation, for the product of its fermentation is furnished by sugar foreign to milk, purposely added to it. Kumyss may, therefore, more properly be defined as being obtained by alcoholic fermentation of sugar, not *of* milk, but *in* milk.

The various phases of the process which take place in the formation of kumyss, and the changes which the constituents of milk must undergo, may be thus briefly stated:

Some sugar is added to milk, then brewer's or cake yeast (grocer's yeast), and the mixture is left to itself. In the course of time, varying in length according to temperature, the effects of alcoholic and of lactic fermentation make themselves apparent, the first, by evolution of gas, through the splitting up of some of the sugar into alcohol and carbonic acid, of which the latter is the most conspicuous; the lactic fermentation, by the appearance of lactic acid, generated through a re-arrangement of the atoms in the sugar molecule, and in the influence of lactic ferment, which transformation manifests itself by throwing the casein out of solution.

While albumen may be considerably acidulated without losing its solubility, casein, as an alkali-proteid, is soluble only in slightly alkaline solutions, and is extremely sensible, in this respect, towards acids. If lactic fermentation is so far progressed that neutrality is passed, the casein is thrown out as a coherent jelly, which, when undisturbed, becomes more compact by contraction and expulsion of serum, and finally conglomerates into separate fibrous lumps, which cannot be divided any more. But if this gelatinous precipitate is agitated ever so slightly in the incipient stages of its formation, it is readily broken up into an impalpable cream, which may be kept finely suspended in the liquid for a length of time, if the necessary conditions of temperature are observed.

If the generation of carbonic acid gas has been lively enough before the lactic fermentation produces its effects, or if it is aided by occasional shaking of the bottles, all the butter fat is enveloped in the precipitate of the casein without affecting its divisibility. Hence the function of the carbonic acid is this, that by the expansion and mobility due to its gaseous nature, it reduces the casein to the finest possible condition—much finer than other mechanical means can do. When the precipitation and division of the casein are effected, and enough carbonic acid gas is found to cause lively effervescence, the kumyss is ready for use. The time in which this is accomplished depends on conditions of temperature at which the fermentation takes place, and on the proportions of the additions. Upon the observance of the most favourable conditions depends also the quality of the product, and it is here where the formula and the directions given in the National Formulary need a correction, in order to obtain an irreproachable preparation of kumyss.

a Addition of Sugar.—Milk-sugar is not readily attacked by yeast. Contrary to statements in books that vinous fermentation will set in after the milk turns sour, and that thereby the milk-sugar becomes changed into glucose, I find that milk more easily enters fermentation under addition of an alkali, by which the souring is prevented. The same is the case with cane-sugar; and as it is desirable to have the alcoholic fermentation started before the lactic fermentation acts on the casein, the addition of fermentable sugar, in the shape of grape sugar or honey, is indicated. Its quantity must be regulated according to requirements only. Nothing is more annoying to the unwary consumer than the opening of an overcharged bottle of kumyss, which generally results in the spattering of its contents promiscuously about the room. The quantity prescribed in the N. F. for two pints of milk is amply sufficient for two gallons, and may only be increased for kumyss dispensed in patent bottles, or if drawn from ordinary bottles by means of a tap.

b Temperature.—The temperature prescribed in the formula may turn out to be disastrous in the manufacture of kumyss.

Milk is a peculiarly complex preparation. It is not an emulsion, as sometimes stated in books, but contains the fat inclosed in separate cells, which rises to the surface as layer of cream if milk is left in undisturbed repose or subjected to centrifugal force. Boiling does not burst these cells or separate the fat; but if milk is left for hours at a temperature above the melting point of butter fat, 65° F., or if subjected to violent commotion, such as churning at the same temperature for a short time, practically all the fat is separated. Again, if casein is precipitated from fresh milk by means of acids, at any temperature, it encloses all the fat in its meshes, and also the jelliform casein separated from milk by rennet includes the butter firmly. But if milk is allowed to turn sour, the fat separates from the casein readily by keeping it a short time at temperatures above the melting-point of the butter-fat. At the same time the finely divided casein conglomerates into more compact lumps, and the kumyss is spoiled.

Although milk, as long as it is sweet, may be kept at 90° F. with impunity, this same temperature is deleterious to the product after souring sets in. The casein turns lumpy, and the fat may be seen floating in the neck of the bottle as a yellow mass. This temperature is unnecessary for the manufacture of kumyss. Vinous fermentation takes place at much lower temperatures, and the higher degrees only favour the lactic fermentation by which the kumyss gets too acid to be drunk by the bottleful.

The sugar is not all consumed by either kind of fermentation. If milk is allowed to turn sour, only one-tenth to one-eighth part of its sugar is changed to lactic acid, and also the vinous fermentation stops before all the sugar is used up. But the lactic fermentation goes on slowly, acting on the sugar which is left, and the kumyss turns gradually more and more acid the longer it is kept. Pretty old samples of kumyss still react on Fehling's solutions.

In place of preparing kumyss with sweet milk, and waiting until it turns sour, the casein may be precipitated at once, by the addition of one-third of ready kumyss to fresh milk. Yeast is not necessary, but sugar must be added to produce enough carbonic acid gas to cause effervescence.

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* From the *American Druggist*, April.

Kumyss may also be made from sour milk, freed of its crust of cream, by breaking up the gelatinous mass by vigorous concussion, and causing alcoholic fermentation by addition of sugar and yeast. This preparation would be nearly devoid of cream, but a proportion may be brought in by addition of sweet milk.

The time in which kumyss becomes ready for use depends as much on the quantity and activity of the ferment as on the temperature. With plenty of yeast and a prevailing temperature nearer to 90° than 60° F., the course of fermentation may be said to be even stormy, and the process is completed in as many hours as days may be consumed when the temperature is kept lower. But it is safer to operate at a lower temperature, by which a much finer product is obtained. Besides, by a slow after-fermentation, the kumyss becomes ripened, and in the course of one to two weeks a cheesy or butyraceous flavour is acquired which is generally regarded as a necessary characteristic of good kumyss.

Commercial preparations of kumyss never correspond to fully undiluted milk. Kumyss made from undiluted milk is too rich and requires too great care to be practicably handled by the large manufacturer. But the pharmacist who disposes of his own production directly to the customer may easily take the necessary precautions against disastrous influences, and may give his customers the benefit of an undiluted preparation, which kumyss is supposed to be.

Samples of commercial preparations of kumyss I found either to be more or less deficient in cream, or to be made from watered milk, or both. Dr. Brush's kumyss, for instance, commanding the largest sale in New York, gave, on analysis, only two-thirds of the casein and fat in the proportions in which they exist in milk, indicating a corresponding watering of the milk.

B. *Kephir.*

This is a fermented milk beverage identical with kumyss in its finished state. It differs from the latter by being produced by aid of a different ferment. The kephir ferment was originally brought from the Caucasus, but may be procured in this market from home culture. It comes in the shape of grains of various forms and sizes, very much resembling bits of the inflorescence of cauliflower, constituting a compound fungus growth resulting from the cohabitation of a fleshy fungus with a certain species of *Saccharomyces*, which latter alone plays the active rôle of enacting vinous fermentation of the saccharine constituent of milk. This peculiar *Saccharomyces* differs from the brewer's yeast by starting vinous fermentation without addition of a fermentable sugar, and fermentation progresses to a certain advanced degree while the milk is yet sweet, or before lactic fermentation produces its effect. It is therefore possible to obtain an effervescing kumyss by its aid with a much less degree of acidity than that obtained by the *Saccharomyces cerevisiæ*, and it may be concluded that kephir yeast is better adapted for the fermentation of milk than beer yeast is. By after fermentation the same degree of acidity is reached as in kumyss obtained through the action of ordinary yeast. This peculiarity has led to a distinction in the use of the different stages of the fermentation of kephir, as it has been observed that young kephir which is yet sweet acts as a slight purgative, while an older, or more acid, or "stronger" kephir exerts a constipating effect on the bowels, and is less easily borne by delicate stomachs.

Kephyr kumyss is prepared by adding active kephir grains to milk, preferably kept at a temperature between 70° and 80° F., until the effect of fermentation becomes apparent by the rising of the grains to the surface, being carried upward by bubbles of carbonic acid gas attached to them. The grains may then be strained off, and the milk, which now contains enough yeast cells to insure the continuance of the fermentation, left to itself in well-corked bottles.

As the yeast cells propagate themselves, more fresh milk may be added previous to bottling.

The directions accompanying the kephir grains direct that the grains should be left in the milk until the casein separates from the serum, and that this strained product shall be used as the ferment of about four times its bulk of fresh milk. (Several prominent houses who sell kephir grains accompany them by printed directions which fail to start their activity altogether.)

If kephir is once obtained by this means, the further production may be simplified in the same manner as in the case of kumyss, by adding a quantity of ready kephir to a multiple of fresh milk, and this may be continued through many generations without having further recourse to the original kephir grains.

The printed directions recommend the employment of milk previously boiled. The advantage of this proceeding is supposed to be this, that the lactic fermentation is retarded, to which end a washing of the kephir grains with a two per cent. solution of carbonate of sodium is prescribed for the removal of the rest of lactic acid tenaciously retained by the grains.

Commercial kephir grains may be found to be quite inert by the buyer uninitiated in the art of devoloping them properly. The fact is, that their activity must be first started, and directions to do so are given with the samples, but in spite of following them closely, they may fail to give satisfactory results. The secret of success seems to me to be to keep the grains in fresh milk at a temperature of 70° to 80° F., and to change the milk once or twice daily, or as often as the milk threatens to become sour. The time may have to be extended to a week, until their action becomes manifest by the generation of gas.

Kephir grains are also apt to decay, and those inert grains have to be removed. Those which retain their vitality may be recognized by their turgor or toughness to the touch, while the decayed ones crumble between the fingers like soft cheese.

The usefulness of kumyss as a dietetic hinges upon the fine division of its casein. Indeed, if a well-prepared kumyss is subjected to digestive influences, the finely divided and diffused precipitate of casein dissolves at once, while the floccular casein, otherwise obtained, resists the peptic action remarkably long.

C. *Matzoon.*

Matzoon is a peculiar milk preparation, also stated on the label to be fermented milk, although there is no evidence of its having undergone alcoholic fermentation. It is devoid of gas, and appears as a viscid liquid, showing a rather coarsely granular mass of precipitated casein, well suspended in a serum which corresponds to that obtained from sour milk. Although betraying great richness from its appearance, the analysis gives amounts of casein as corresponding to undiluted milk and two-thirds of its cream.

1 fl. oz. of cow's milk contains grains (average).		Kumyss from milk:	Dr. Brush's kumyss.	Matzoon.
Sugar. . .	22	—	—	20
Casein . .	14	14	10	14
Fat . . .	15	15	9	7
Lactic acid.	—	1·5	3	·1

Glucose. Lactic acid. Glucose. Alcohol.

$$C_6H_{12}O_6 = 2HC_3H_5O_3 \qquad C_6H_{12}O_6 = 2C_2H_6O + 2CO_2$$

Glucose yields by fermentation :—

Alcohol	48·5 per cent.
Carbonic acid	46·5 ,,
Glycerin	3·6 ,,
Other products	1·4 ,,

The Pharmaceutical Journal.

SATURDAY, JULY 27, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ALKALI WORKS INSPECTION.

THE report of the Chief Inspector of works devoted to the manufacture of alkali and to similar chemical operations has just been issued, and as usual it contains much information of a useful as well as interesting nature. This is the twenty-fifth annual report that has been issued since the Alkali Works Regulation Act of 1881 came into operation, and it is satisfactory to find that any feeling of apprehension there may at first have been as to the work of the Government inspectors causing interference or inconvenience to manufacturers has given place to a very general recognition of the fact that it is really beneficial to them as well as to the public. Although it is the business of the inspectors to detect the escape of injurious gases and to take means for preventing the continuance of nuisance of that kind, it is not their object to do so by seeking for and collecting materials on which to base a prosecution, but rather by assisting manufacturers in keeping within the requirements of the Act. It has been found that one of the best ways of giving help in this direction is by inducing manufacturers to maintain a constant system of testing the effluent gases discharged from the operations they carry on, and also to employ for the supervision of their works the best-skilled assistance they can obtain. The value of such assistance is being recognized, and Mr. CHANCE, in speaking on this subject, has given expression to the prevailing opinion that Government inspection of chemical works has led to material improvement in their general management and been of such distinct benefit to the owners of them that the inspectors ought to be regarded in the light of friends. Altogether the alkali manufacture offers a striking illustration of the proverb that necessity is the mother of invention, and of the advantage of a little pressure as promoting progress. The origin of the process that has hitherto been relied upon as a source of soda was due to the necessity of finding a substitute for the kelp soda that was formerly the raw material employed. LEBLANC'S method of decomposing common salt and soda sulphate supplied that want so well that it soon became the only source of soda salt. At a later date the stoppage of the supply of sulphur from Sicily necessitated the provision of a substitute for the manufacture of sulphuric acid, and the use of pyrites as a source of sulphur was thus introduced with much advantage. Then the necessity of preventing the escape of hydrochloric acid as a waste product of the decomposition of salt, though at first thought to be irksome, became the means by which alone it was possible to obtain a profit from the manufacture of alkali by the LEBLANC process. And lastly the growing necessity of doing away with the nuisances arising from the "waste" produced in that process, gives promise of the development of new methods for its utilization and of alternative processes for the manufacture of soda without any production of the "waste" that has been so much trouble as refuse.

The magnitude of the alkali industry may best be shown by reference to the quantity of the chief raw materials employed in connection with it, and the collection of statistics of this nature has been incidentally carried out by the inspectors while making their visits. In the year 1888 the quantity of salt consumed for this purpose by the LEBLANC process in the United Kingdom was 655,902 tons, or an excess over that used in 1887, amounting to 6,035 tons. In addition some 212,181 tons were used for producing soda by the ammonia process. The latter process, which has at length come to be such a serious competitor with the LEBLANC process, that it may eventually supersede it altogether, has been developed only within the last few years. Its rapid progress may be judged of from the fact that while in 1886 the quantity of salt used for it was only one-sixth of the whole quantity used for making soda, in 1888 it amounted to nearly one-fourth of it. During the past year the quantity of native sulphur burnt for the manufacture of sulphuric acid was 17,975 tons, but the quantity of pyrites burnt for the same purpose was about 600,000 tons, and the quantity of salt manufactured was 2,039,867 tons. The chief basis on which the working of the LEBLANC process is now continued is the production of hydrochloric acid, which was at one time regarded only as a bye-product, and was got rid of entirely by discharging it into the atmosphere. As yet the ammonia process has not succeeded in producing hydrochloric acid or chlorine so as to add the making of bleaching powder to the work done by it, and it is only while this condition remains unchanged that the LEBLANC process can hold its ground. Hence for a long time past it has been the object of chemists to utilize the sulphur locked up in the "waste" resulting from that process. That material contains from 11 to 15 per cent. of sulphur, and as the total quantity of "waste"

annually produced is about 750,000 tons, representing about 100,000 tons of sulphur, success in that direction would be highly profitable. The problem is either to recover the sulphur or to avoid the formation of "waste." The process devised by Mr. CHANCE for the former purpose is one of the most promising, and it has already been adopted by many alkali manufacturers. The sulphur it yields is of very high quality, and the amount recovered is at present about 90 per cent. of that in the waste operated upon. The realization of this object is also being attempted by a new process of soda manufacture, proposed by Messrs. PARNELL and SIMPSON, which admits of the recovery of the whole of the sulphur in alkali "waste." But a still more radical attack of the difficulty is the process suggested by Mr. GOSSAGE, of decomposing soda sulphate into sodium sulphide by the action of carbon at a high temperature. The formation of "waste" would thus be avoided, and by the action of carbonic acid on the sodium sulphide dissolved in water sulphuretted hydrogen would be evolved and bicarbonate of soda produced. All three of these processes promise support for the LEBLANC process and important results in the removal of its most objectionable feature.

Another very interesting subject referred to in the report of the alkali works inspector is the prevention of black coal smoke. A strong feeling is entertained by the public that the evils arising from this source should be diminished. That they are very serious there can be no doubt; but very erroneous ideas prevail on this subject, for the correction of which we may well look to the intervention of the inspectors under the Alkali Act. Already a step in that direction has been taken. In the newspaper correspondence that has been carried on lately it has been contended that the suppression of black smoke should not be insisted upon because the black smoke is a guarantee that the poisonous gas carbonic oxide is absent and because the presence of that gas in chimney smoke would be still more prejudicial. Chemists would naturally perceive the fallacy of this assertion, but with those who cannot form a judgment from that point of view, the argument in favour of black smoke has been accepted. It is therefore very useful that in the report now referred to the results of a number of analyses of chimney gases are given which show that the above-mentioned statement as to the absence of carbonic oxide being indicated by the blackness of the smoke is entirely incorrect. In reality carbonic oxide is but rarely present in chimney gases, and in all instances where it occurs it is accompanied by black smoke, showing that the presence of the one as well as the other is due to imperfect combustion. This is precisely the evil to be dealt with for the suppression of black smoke and for preventing waste of fuel. The mode of burning coal now in use is defective chiefly by reason of its want of regularity, and the mechanical stokers which have hitherto been offered in its place have not been sufficiently successful to supersede it. Much more is to be expected from the system of converting coal into gas before it is burnt. The late Dr. SIEMENS' labours in that direction were very useful in various industries, and a further development of the system by Mr. MOND seems likely to be of great value to the chemical manufacturer, since it not only affords gas which is incapable of causing black smoke when burnt, but also admits of the nitrogen of the coal being recovered as ammonia. The use of gaseous fuel, indeed, appears to be the most hopeful means of preventing black smoke, and as it is attended with other advantages for the fuel consumer of a nature to compensate for increased cost, it appears to be time that out of regard for the public health and convenience its application by manufacturers should be promoted by some external pressure at least in towns and densely populated districts.

INTERNATIONAL CONGRESS IN PARIS.

A COMPLETE programme has now been issued in connection with the International Congress of therapeutics and materia medica to be held in Paris next month. The place of meeting is to be the Hotel des Societés savantes, 28, Rue Serpente. The sittings will commence on the 1st of August, and continue until the 4th. The first business will be to elect officers and arrange for the reading of papers in the several sections, which will meet each day in the morning and general meetings will be held in the afternoon. Up to the 1st inst. the number of members amounted to 450, and the organising committee had received notice of several deputations that would attend to represent foreign Governments or learned Societies. The list of papers to be read in the section of materia medica and pharmacology has been published, but it does not present any feature of striking interest, and it is probable that the reports which we mentioned in a previous note will chiefly occupy the attention of the Congress. In reference to the subjects of four of those reports communications have been sent in to the Secretary of the Congress. The subject of an international pharmacopœia does not offer opportunity for being dealt with in the same manner, but several pharmacists have announced their intention of taking part in the discussion that may be expected to follow the reading of Professor SHAER'S report. On the 3rd August there is to be a dinner for the members of the Congress. It will take place on the first platform of the Eiffel Tower at 7.30 p.m. The ticket, costing 20 francs, will give admission to the Tower.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

July 9, 10, 11, 12, 17, 18 *and* 19, 1889.

Present on the 9th.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gale, Gerrard, Greenish, Ransom, Saul, Symons, Tanner and Taylor.

Present on the 10th, 11th, 12th, 17th, 18th and 19th.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gale, Gerrard, Greenish, Ransom, Saul, Symons, Tanner, Taylor and Thresh.

Dr. Stevenson was present on the 9th, 12th and 17th, on behalf of the Privy Council.

MAJOR EXAMINATION.

9*th.*—*Eight* candidates were examined. *Three* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Church, Edward Harry.....Cambridge.
Cox, Herbert Victor .....Southampton.
Grice, Joseph Ed. Brindley ...Brighton.
Harper, Edmund William.....Ossett.
Jones, John .....Llandovery.

10*th.*—*Seven* candidates were examined. *Four* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Livesley, Thomas Henry .....New Mills.
Routley, Edwin Walter.....Bath.
Smith, Frederick.. .....London.

17*th.*—*Eight* candidates were examined. *Two* failed. The undermentioned *six* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Davison, Daniel .....Cromer.
Fuge, Harry Dixon.....Matlock Bath.
Fuller, George Sydney .....Thornton Heath.
Hobbs, Alfred Ernest.....Tunbridge Wells.
Latchmore, Alfred .....Plymouth.
Norman, Richard Henry .....Cottenham.

18*th.*—*Seven* candidates were examined. *Two* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Smith, Albert .....Royston.
Sturton, John Gilbert .....Peterborough.
Thornley, John Brooks .....London.
Wain, Clement John .....Hanley.
Young, Edward Francis.....Portishead.

MINOR EXAMINATION.

9*th.*—*Twenty* candidates were examined. *Thirteen* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Agar, John George ..... Mansfield.
Arrandale, James William.....Denton.
Bate, Arthur Macaulay .....Northampton.
Boor, Harry Herbert .....Spalding.
Bowron, Henry Edward .....Liverpool.
Broadbent, Harry Ralph .....Manchester.
Burnett, Augustus Frederick...Highbridge.

10*th.* — *Twenty-five* candidates were examined. *Fourteen* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Ashton, Thomas Richard .....Manchester.
Brown, Herbert ....Carrington.
Chappelow, Thomas Henry ...Southampton.
Chown, Harry Clement .....Lympstone.
Clegg, Alfred Joseph.....Wantage.
Cross, Frederick George .....Birmingham.
Crozier, George Dixon .....Carlisle.
Davies, Daniel Evan .....Carmarthen.
Donellan, Arthur W. Ernest...Crewe.
Ellwood, William Mark.....Leominster.
Elmitt, William .....Lincoln.

11*th.*—*Thirty* candidates were examined. *Twenty* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Fletcher, William George.....London.
Gelston, Percival John Neill...Derby.
Gibson, William Thomas .....Collingham.
Godding, William Charles.....Tunstall.
Greening, George F. Gregory...Dorchester.
Harries, Howell .....St. Clears.
Hewitt, Joseph Frederick.....York.
Hillman, Charles Edward .....Westbury.
Hook, Richard Graves .....Bridgwater.
Hurd, William .....Nottingham.

12*th.*—*Twenty-eight* candidates were examined. *Nineteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Jacks, Frederick.....Longton.
Jago, Charles Albert .....Plymouth.
Jones, John Rees.....Tredegar.
Judd, Walter Rossell.....Liverpool.
Leech, Charles Richard.....Cambridge.
Lines, Charles Montague .. ...Bedford.
London, Walter Augustus.....Redditch.
Lowe, Osmond Henry .....Maidenhead.
Weighill, William Lancelot ...West Hartlepool.

17*th.*—*Twenty-five* candidates were examined. *Fourteen* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Morgan, Ebenezer .....Carmarthen.
Morton, Lawrence Knyvett ...Kennington.
Page, Percy Dodson .....Boston.
Parsons, Henry Imber .....Barnstaple.
Perks, Alfred .....Birmingham.
Postlethwaite, Thomas ....Kirkby-in-Furness.
Price, Walter William ....Worcester.
Priestley, Lawrence .....Nottingham.
Rodgers, Ivo Frederick Joseph Stafford.
Roe, George ....London.
Rose, Joseph Gandy .....Buxton.

18*th.*—*Twenty-five* candidates were examined. *Twelve* failed. The undermentioned *thirteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Batty, Charles.....Glossop.
Hughes, Thomas Edward .....Newtown.
Jacques, Sidney Paul.....London.
Jeffcoat, Joseph George.....London.
Lawrenson, John .....Radcliffe.
Marsden, Prosper Henry .....Manchester.
Norman, Edwin .....Ripley.
Page, William Irwin ... .London.
Rhodes, Alfred Barrett .....Manchester.
Roper, Frederick Alfred.....Plymouth.
Scott, Claude W. Lascelles ...Ulverston.
Talintyre, William John .....Stockton-on-Tees.
Taubman, Frank Mowbray ...London.

19*th.*—*Twenty-eight* candidates were examined. *Sixteen* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Dryden, Thomas.....Landore.
Smales, Alfred John .....Darlington.
Turver, Charles Henry .....Newark.
Venning, William .....Pyworthy.
Vincent, William .....Truro.
Waterhouse, Albert .....East Bierley.

Watkinson, William Harrison...Farnworth.
Watt, John Charles .....Darlington.
Westlake, George Frederick...London.
Wilson, James Beetham .....Nottingham.
Wyatt, Alvan Lovell .....Stourbridge.
Wynne, William Arthur.....Mold.

PRELIMINARY EXAMINATION.

19*th*.—Certificates by an approved examining body were received from the undermentioned in lieu of the Society's examination:—

Le Cudennec, Louis Edouard...Mauritius.
Tuffin, Alfred Henry .....Sherborne.

The Report of the College of Preceptors on the examination held on July 9 was received.

Three hundred and fifty-seven candidates had presented themselves for examination, of whom *one hundred and ninety-nine* had failed. The following *one hundred and fifty-eight* passed, and the Registrar was authorized to place their names on the Register of Apprentices or Students:—

Adan, James Watt .....Aberdeen.
Armitage, Nathaniel Newborn.Armley.
Atkinson, Thomas Cawood ...Driffield.
Ball, William Titus.....Swansea.
Barclay, Robert Wilson.....Banff.
Barker, John Faulkner .....Milnthorpe.
Bidie, Francis William.....Banbury.
Black, John .. ..Aberdeen.
Bloomfield, Edwin James.....Leamington.
Bond, John Henry Price .....Coleford.
Bowden, William .....London.
Bray, George Thomas .....Lincoln.
Brooks, John William .....Bolton.
Buckingham, Harry .....Coventry.
Burch, Libbis Napier..... ..Wigan.
Burnett, Thomas..... .....Lytham.
Bygott, Henry Walter .....Brigg.
Chester, Charles Henry... .... Kettering.
Clark, Henry Goldspink .....Lowestoft.
Cole, Beatrice .....London.
Collier, Frederick Tames .....Birmingham.
Corfe, John Martin.....Maidstone.
Cousins, George Herbert .....Ambleside.
Curry, Ralph Shield .....Sunderland.
Cuthbertson, Thos. Maitland...Lostwithiel.
Darby, Herbert Christopher...London.
Denton, George Clark .....Hull.
Dickins, Frederick.....Bridlington Quay.
Dickson, Thomas George .....Montrose.
Dixon, John William.....Milnthorpe.
Dixon, Rowland .....Sheffield.
Dumper, Lewis.....Newbury.
Duncan, James .....Leeds.
Duncan, James Alexander ...Dundee.
Edwards, Henry Vercoe.....Redruth.
Evans, Evan Lewis.....Llandyssul.
Eyre, Sidney..... .....Sheffield.
Fairlee, Alfred James.....Carlisle.
Flood, Fanny ....London.
Forrest, Thomas Wotherspoon.Leith.
Forrester, Joseph ..... Stoke-on-Trent.
Fortune, William .....Aberdeen.
Freeman, Alfred Percy .....Manchester.
Frost, John Ernest.....Worthing.
Gee, Alfred Charles.....Redruth.
Glendinning, Charles Crerar...Langholm.
Gooden, William Henry.....Duddingston.
Grant, George Brown.....Fochabers.
Gregory, Herbert William.....Lincoln.
Hamilton, Andrew .....Forres.
Hampton, William Henry.....Cheltenham.
Hardman, James Chevalier ...Leeds.
Hardy, Samuel..... . ...Liverpool.
Haywood, Herbert .....Coventry.
Heden, Joseph Henry.....Kineton.
Hemming, John Wilson.....Wolverhampton.
Henderson, Andrew Webster...Aberdeen.
Hill, Richard Barker .....Howden.
Hole, John Beeston.....Mansfield.
Holt, William .....Dukinfield.
Homan, Charles Edward .....Maindee.
Hughes, David.....Bath.
Ibbotson, Oswald.....Wakefield.
Imlay, Charles Wilson .....Banff.
Jewson, William Thomas N....Long Eaton.
Johnson, Herbert.....Normanton.
Johnson, James .....Wigan.
Johnson, William Arthur .....London.
Jones, David Thomas.....Llanidloes.
Jones, John Edmund .....Kilnhurst.
Jones, John Philip .....Holywell.
Jones, Robert .....Sarn.
Jones, William Miall .....Aberystwith.
King, Charles Edward .....Berkhamsted.
Kirkpatrick, John Donaldson...Teignmouth.
Knight, George Thomas.....Halesowen.
Laidlaw, Daniel .....Hawick.
Last, Ernest Charles .....Ipswich.
Latham, William.....Nantwich.
Latham, William Henry .....Wigan.
Leighton, Alexander .....Aberdeen.
Logan, James .....Peterhead.
Long, Herbert Samuel A. .....Lowestoft.
Longley, John William Percy...Leeds.
Male, Elliott William Graves...Soham.
Mallinson, Fred. .....Liversedge.
Mannox, Lizzie Greener.....Birmingham.
Martin, Hugh Gray .....Peterhead.
Massingham, Arthur Edward...Lowestoft.
Mather, Mary Sophia.....Clifton.
Matthews, Robert John.....Penzance.
Maxwell, Arthur Thomas .....Gateshead.
Mays, Sydney Walter.....Nottingham.
Moore, Arthur .....Rotherham.
Morris, George Hy. Actæon ..Bridgnorth.
Mundell, Stephen .....Leeds.
O'Brien, John Thomas .....Wigan.
Osborne, Arthur Ralph .....Stony Stratford.
Parry, John .....Llandyssul.
Paterson, Andrew John Kidd...Dundee.
Pattison, Herbert George .....Shrewsbury.
Petrie, John M. .....Arbroath.
Pickworth, George Boyer .....Congleton.
Preston, James Bateson.....Oxenhope.
Reed, William Herbert . .....Bristol.
Reekie, Balfour .....Glasgow.
Reekie, Thomas .....Woolwich.
Rees, John Samuel.....Carmarthen.
Richmond, Edmund .....Sittingbourne.
Robertson, Sidney .....Norwich.
Robertson-Macdonald, Margaretta...London.
Robson, John Thomas .....London.
Ross, Alexander .....Kirriemuir.
Samuels, Herbert Geo. Lewis...Bath.
Sanderson, Joseph .....Glasgow.
Sandlin, Henry.....Maidstone.
Sargeant, Fred. Pilkington ...Chorley.
Sawyer, Robert Bowlby.....Hull.
Scott, George L. .....Hawick.
Seymour, William Herbert ...London.
Shackleton, George Harry.....Abergavenny.
Shearn, Ernest Henry.....Thetford.
Sime, Lewis ..... Rothes.
Simpson, Herbert .....West Hartlepool.
Simpson, John Fenwick.....Newcastle-on-Tyne.
Smith, Charles Henry.....London.
Smith, George William .....Oakham.
Smith, Thomas.....Hull.
Smith, Thomas Mathie .....Musselburgh.
Smith, William Edgar .....Hyde.
Snelling, Edith Harriet.....London.

Spencer, Robert Shenstone ...London.
Sproat, Samuel Cowan .....Castle Douglas.
Spurrier, William Edward.....Colchester.
Staddon, Henry James .....Gillingham.
Stewart, Mary Ariel .....Cheltenham.
Stuttard, Thomas .....Burnley.
Taylor, Frederick Haydn .....London.
Taylor, John Henry .....Newcastle-on-Tyne.
Taylor, John Ratcliffe .....Workington.
Taylor, William ....Accrington.
Troup, Alexander Stephen ..Fyvie.
Turner, Alfred William .....Westbury-on-Severn.
Tutt, George Francis .....Ashford.
Waddington, Joseph Edwd. G..Manchester.
Wade, John .....Seaham Harbour.
Walker, Helen Charlotte .....Malvern Link.
Wass, Charles .....Wellingborough.
Watts, Herbert ....Darnall.
Watts, William Clarke .....Foulsham.
Whitton, Andrew Crichton ...Dundee.
Williams, Richard John .....Carmarthen.
Willson, Robert Wherry .....Peterborough.
Wilson, Robert Hanbury .....Stourbridge.
Winston, William Ripley ... ..Ulverston.
Woolfenden, Thomas .....Rochdale.
Woollen, John James.....Taunton.
Wynn, Herbert Alfred .....Melton Mowbray.

The questions set at this examination were published in the *Pharmaceutical Journal* for July 13, p. 29.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	20	11	9	Lancaster	7	4	3
Birmingham	19	8	11	Leeds	21	9	12
Brighton	2	1	1	Lincoln	2	2	0
Bristol	9	4	5	Liverpool	11	3	8
Cambridge	6	1	5	London	45	15	30
Canterbury	7	3	4	Manchester	28	15	13
Cardiff	6	2	4	Newcastle-on-T.	14	5	9
Carlisle	13	4	9	Northampton	6	3	3
Carmarthen	10	6	4	Norwich	8	7	1
Carnarvon	6	1	5	Nottingham	9	4	5
Cheltenham	6	4	2	Oxford	2	1	1
Darlington	1	1	0	Peterborough	3	1	2
Douglas	1	0	1	Sheffield	12	5	7
Dundee	13	6	7	Shrewsbury	5	4	1
Edinburgh	19	5	14	Southampton	7	3	4
Exeter	6	2	4	Truro	8	4	4
Glasgow	5	2	3	Worcester	4	3	1
Hull	11	7	4	York	2	0	2
Inverness	3	2	1				

COUNCIL PRIZES EXAMINATION, 1889.

I. PEREIRA MEDAL (SILVER); and Books of the value of £5 presented by Mr. T. H. Hills.

II. PHARMACEUTICAL SOCIETY'S MEDAL (SILVER); and Books of the value of £3, presented by Mr. T. H. Hills.

III. PHARMACEUTICAL SOCIETY'S MEDAL (BRONZE); and Books of the value of £2, presented by Mr. T. H. Hills.

The following are the questions that were set at the Council Prizes Examination held on Thursday, July 25:

BOTANY AND MATERIA MEDICA.

Time—10 *a.m. to* 1 *p.m.*

Botany.

1. Define a cystolith, globoid and crystalloid and indicate how the presence of the two latter may be demonstrated in the same cell.
2. State in what way a Diatom differs from a Desmid.
3. State two views as to the constitution of Lichens.
4. How would you proceed with a species of the Umbelliferæ with a view to refer it to its place in the order?
5. Write a short article on Cross fertilization and its effect on Species.

Materia Medica.

1. A vegetable substance under examination has been treated successively with the following solvents:—Petroleum Ether, Pure Ether, Absolute Alcohol, Water, Dilute Solution of Soda, Dilute Hydrochloric Acid. State what proximate principles may be removed by each solvent.
2. Name some of the products of the genus Citrus; and give two methods for procuring Oil of Lemons, stating which method yields the more valuable product.
3. Write a short description of Strophanthus and give percentage of active principle.
4. Give the method of preparing Euonymin and state principal adulterations.

Chemistry.

Time: 2 *to* 5 *p.m.*

1. Describe in detail the process by which the composition of water by weight has been determined.
2. Zinc and magnesium are regarded as belonging to the same chemical group, but are placed in different ones for the purposes of qualitative analysis; give reasons for their position in each case.
3. What impurities should you expect to find in commercial phosphate of lime? How should you determine the proportion of real tricalcic phosphate?
4. Give a short account of the periodic law, and discuss its bearing on future chemical research.
5. What is the result of passing chlorine through (1) excess of ammonia, (2) aldehyde, (3) acetic acid.
6. What is naphthalin? Give its graphic formula. How is benzoic acid prepared from it?
7. One gram of a substance gives on combustion 1·466 grams carbon dioxide 0·599 gram water—find its percentage composition and empirical formula. What methods would you adopt in order to determine the rational formula of a compound of which the empirical formula was known?

EXAMINATIONS IN EDINBURGH.

July 17, 18, 23 *and* 24.

Present on each day—Messrs. Clark, Dott, Gibson, Gilmour, Kinninmont, Nesbit, Maben and Stephenson.

Professor Sir Douglas Maclagan was present on the 24th, on behalf of the Privy Council.

MAJOR EXAMINATION.

17*th.*—*Three* candidates were examined. *One* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Brown, James Joseph.....Perth.
Robertson, William George ...Jedburgh.

MINOR EXAMINATION.

17*th.*—*Eleven* candidates were examined. *Four* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Anderson, James Grant.....Aberdeen.
Archibald, David .....Kelso.
Bell, Peter .....Edinburgh.
Bethune, Andrew Wright.....Lochgelly.
Brown, John.....Edinburgh.
Buckley, Herbert .....Stalybridge.
Buckley, John William .....Stalybridge.

18*th.*—*Thirteen* candidates were examined. *Five* failed. The undermentioned *eight* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cumming, John .....Aberdeen.
Dods, John Henry .....Market Deeping.
Ellis, Jeremiah .....Batley.
Farthing, George Thompson...Spennymoor.
Findlay, James ....Edinburgh.
Forster, James ... .Musselburgh.
Hadden, Alexander .....Aberdeen.
Hughes, Edmund W. Crawford.Holywell.

23*rd.*—*Thirteen* candidates were examined. *Ten* failed. The undermentioned *three* passed, and were declared qualified to be registered as Chemists and Druggists :—

Harbottle, Bernard.....Alnwick.
Montgomery, John Stuart.....Southampton.
Robbie, Charles Thain .....Aberdeen.

24*th.*—*Twelve* candidates were examined. *Seven* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists :—

Heywood, William.....Heywood.
Speedie, Robert .....Edinburgh.
Taylor, William ....Macclesfield.
Thomas, David .....Brynaman.
White, William Stokoe .....Skipton.

Proceedings of Societies in London.

ROYAL COLLEGE OF PHYSICIANS.

[Croonian Lecture.]

Relation between Chemical Structure and Physiological Action.

BY T. LAUDER BRUNTON, M.D., F.R.S.

(*Continued from page* 55).

Acids as Hypnotics.—The presence of any substance which will tend to increase the formation of acid in the nerve cells ought therefore to have a hypnotic or even an anæsthetic action. Now, according to Binz, this actually occurs, and chlorine, bromine, iodine, ozone and nitrites have all a more or less hypnotic action. The fumes of chlorine, bromine or iodine, inhaled by a frog causes paralysis of the nerve centres, without any previous convulsions, and this paralysis is due to their action on the protoplasm of the nerve centres, according to Binz. On account of the local irritant effect upon the respiratory passages and the alteration they occasion in the blood they cannot be brought in contact with the nerve centres of mammals in the same way as with those of the frog, and therefore they cannot be employed as anæsthetics; but, nevertheless, they tend to exert a similar action in mammals, and when combined with alkyls they tend greatly to increase their anæsthetic action.

Action of Halogens on Muscle.—But I have already mentioned that the same process of contraction or partial coagulation which leads to anæsthesia occurs also, though to a much smaller extent, in the muscles, and the presence of halogens, chlorine, bromine and iodine appears to increase the effects of an alkyl upon the muscles more than it does on the nerve centres.

Thus, the haloid combination of the alkyls, although they are more rapid anæsthetics, tend also to affect muscles, and more especially the heart, in a greater degree than those compounds from which they are absent. A similar tendency to paralyse muscular fibre, both in the limbs and the heart, was noticed by Cash and myself to be produced by combination of the halogens, and particularly iodine and bromine, with ammonia or compound ammonias.

Halogen Compounds as Anæsthetics.—The introduction of the halogens into anæsthetics, therefore, tends to increase the risk attending their use, but at the same time increases their anæsthetic power, and renders them more convenient. A knowledge of the chemical structure of an anæsthetic will thus give us a clue to its advantages and disadvantages, but only actual experiment can decide its practical value.

Limitation in Choice of Anæsthetics.—But the application of any substance as an anæsthetic must not only be possible, it must be convenient and it must be safe. Thus our choice of substances practically useful as anæsthetics from amongst the innumerable substances of the alcoholic group is limited.

Convenience.—In order to be convenient, they must fulfil a good many requirements. They must be easily carried about, and must be readily applied without apparatus; they must not cause much struggling on the part of the patient; they should not take too long to produce anæsthesia, nor should the anæsthetic state last either too short or too long a time; they should not give rise to prolonged discomfort after their anæsthetic action has ceased.

Safety.—In order to be safe they should not have any marked tendency to paralyse the heart. All anæsthetics tend to paralyse the nervous system, beginning within the highest or most volitional centres in the cerebrum, and ending with the lowest or most automatic centres in the medulla oblongata. Hence, if they are pushed far enough, they will all paralyse the respiratory centre and stop the respiratory movements; but these can readily be imitated artificially, and the blood can thus be kept aërated and the tissues supplied with oxygen until the anæsthetic has been either destroyed or sufficiently eliminated from the respiratory centre to allow it to regain its activity. The case is quite different when the heart stops; for then the supply of oxygen in the tissues entirely ceases. The anæsthetic is not eliminated nor destroyed, and the processes of life are arrested. Mechanical stimulation may help the heart to make a few feeble beats, and if artificial respiration be kept up actively so that blood charged with oxygen reaches the left ventricle, it may resume its activity. Nevertheless, stoppage of the heart is much more dangerous than stoppage of the respiration, and those anæsthetics which tend to enfeeble the heart are more dangerous than those which do not.

Inflammability.—In order to be safe in operations where a light is required, or where the actual cautery is to be used, the anæsthetic must not be too inflammable. This objection does not apply if there is no chance of the anæsthetic taking fire, but it may preclude the use, under certain circumstances, of an anæsthetic like ether, which might otherwise be suitable.

Bulk.—The gaseous form used to be very unsuitable for anæsthetics on account of the cumbrous apparatus required. Since the plan has been adopted of compressing the gas into steel or iron bottles, the difficulty is much lessened, although not entirely got rid of, and nitrous oxide is constantly administered now, although it cannot be carried about so conveniently as ether or chloroform. Their gaseous nature was formerly a serious objection to the lower hydrocarbons of the alcohol series, methane, ethane, and propane, all of which are permanent gases, and to butane, which boils at 1°, and is thus a gas at ordinary temperatures. This objection would be obviated by using them in a compressed form like nitrous oxide.

Their inflammability, like that of ether, may preclude their use under certain circumstances, and possibly the cold generated by their expansion may also prove an obstacle to their employment, yet it is possible that they might be usefully employed instead of nitrous oxide, along with ether, chloroform, or other anæsthetics higher in the series.

In 1849 Nunnely, of Leeds, in a letter to the *Lancet*, suggested the use of ordinary coal gas as a safe and convenient anæsthetic, notwithstanding its disagreeable smell. It has never come into general use, but it has quite recently been recommended as a sedative in whooping-cough.

Relation between Chemical Structure and Physio-

logical Action of Anæsthetics.—The physiological action of carbon compounds was investigated by B. W. Richardson, in a most valuable and important research, in which he compared the action of higher and lower members in the alcoholic series, and examined the alteration produced in their action by the introduction of different radicals, such as chlorine, bromine and iodine.

As the results of his investigations he objects to gases on account of the difficulty of administering them, the short duration of their action, and the asphyxia they would produce if administered for a length of time; solids are impracticable, and the anæsthetic must therefore be fluid. The fluid should be homogeneous, as mixtures are unreliable; it should be stable, and not easily decomposed by heat or light; it should have a pleasant smell and cause no irritation when applied to the skin. The boiling point should not be too low, because those boiling under the temperature of the body must be used like gases to the exclusion of air, and those whose boiling point is too high remain long in the body, causing nausea and depression. These conclusions, although they seem *a priori* to be sound, have not quite been borne out by practical experience, for, according to them, chloroform is objectionable, as it irritates the skin, causes vomiting, and is too slowly eliminated. Ether also is objectionable, as having too low a boiling point, and requiring to be used like a gas to the exclusion of air. Nevertheless these two substances are practically the best anæsthetics we have got yet.

HYPNOTICS.

Physiology of Sleep.—In healthy sleep the person becomes unconscious of the external world, voluntary action ceases, and even the automatic centres for the respiration and circulation act less energetically, so that the breathing becomes slow, the pulse quiet, and the vessels tend to dilate. This dilatation of the vessels may be so well marked that it causes the feet to swell, and renders a pair of well-fitting boots too tight. At the same time it makes one more liable to be chilled by exposure to external cold while asleep than while awake. This condition of the vessels has been regarded by some as the cause of sleep rather than its consequence, for the two principal theories to explain sleep are, first, that it depends upon anæmia of the brain; and secondly, that it is due to an exhausted or inactive condition of the brain-cells.

Condition of the Nerve Cells.—In all probability, the truth is that it depends upon the condition of the brain cells, but this is so much influenced by the circulation that frequently the condition of sleeping or waking will depend entirely upon the cerebral circulation. We shall understand this more easily by referring again to Ehrlich's experiments upon oxidation and reduction in the tissues. You will remember that the grey substance of the brain is possessed of a great power of reduction, as shown by the readiness with which it reduces aniline colours after death, but during life the necessity for oxygen is so great that it retains within it a sufficient quantity of stored up oxygen to prevent such reduction taking place under ordinary circumstances. But if its functional activity be augmented by stimulation its store of oxygen is used up, and thus it becomes ready at once to reduce. Its very activity, however, gives rise to the formation of acid products which lessen its reducing power, so that the mere supply of fresh oxygen would not be sufficient to restore it to its previous condition unless the acid were neutralised.

Effect of Arterial Blood.—Arterial blood supplies both these requirements, neutralising the acid and giving off oxygen to the brain cells. Thus, in some conditions of the brain simple increase in the supply of arterial blood will restore functional activity and cause wakefulness, while diminished supply will produce sleep.

Effect of Position.—This has been beautifully shown by Friedländer in a research on the hypnotic properties of isopropyl alcohol. Here the condition of sleeping or waking was simply determined by the position of the animal. If it were held up by the legs so as to increase the supply of blood to the head, it at once awoke, but when held up by the ears it immediately fell asleep. By alternating the positions sleeping and waking could be induced at will. We see the same effect of the circulation in man, more especially in debilitated subjects; some people with feeble tension tend to fall asleep even while standing up, and do so at once on sitting down, and yet are very wakeful in the horizontal position.

Effect of Food.—We very frequently find that people tend to fall asleep after a hearty meal. It is possible that this may be partly due to the absorption of certain digestive products, which may act as soporifics, but it is probable that the dilatation of the gastric and intestinal vessels has much to do with the production of sleep, by drawing away blood from the brain.

Effect of Cold.—We know, too, that cold, unless very intense, tends to prevent sleep, and we see that it also causes contraction of the superficial vessels. It seems probable, therefore, that it prevents sleep in a great measure by driving the blood from the surface of the body to the brain. We cannot see the intestinal vessels, but we know that the abdominal walls are thin in front, and it is almost certain that external cold will act through the adbominal walls on the intestinal vessels, and cause them to contract likewise. Such contraction will also drive the blood to the brain, and tend to prevent sleep, but warmth to the abdomen will tend to relax them and induce sleep. This is probably the reason why dogs, before going to sleep, curl themselves up, so that their abdomen is kept warm by their limbs, and men do the same thing when exposed to cold.

Effect of High Tension.—In cases where the blood tension is high, as in chronic Bright's disease, we often find troublesome insomnia, whereas in cases of debility with low tension, we often find troublesome drowsiness. The condition of the circulation is, therefore, a most important factor in the production of sleep, but it will by itself no more explain completely the insensibility of sleep than it will that of anæsthesia.

Action of the Products of Tissue Waste on the Brain.—We must now turn to the condition of the brain cells themselves. As Ehrlich has shown, the acid products of their functional activity tend to lessen their reducing power, or, in other words, their power of absorbing oxygen. But it is highly probable that other products of tissue change, either in the brain itself or in the rest of the body, have a similar power to that of acids upon the brain cells.

Products of Tissue Waste by Day and by Night.—At all events, Bouchard has found that the toxic substances excreted in the urine during the day have a soporific action, while those excreted during the night have a stimulating action.

Self-Regulating Mechanism of Sleeping and Waking.—It would thus appear that there is a sort of self-regulating mechanism in the body by which sleeping and waking are made to alternate. During the waking hours soporific products are formed, and these, gradually accumulating, will by-and-by induce sleep, while during sleep stimulating products are formed which, after a certain number of hours, will stimulate the brain to wakefulness.

Voit's Observations.—Now Voit found that during the waking hours more carbonic acid is given off, while during sleep the reverse is the case, and more oxygen is absorbed than carbonic acid eliminated. It is therefore evident that during waking, the organism as a whole is an oxidizing agent, while during sleep it is acting as a reducing agent.

Nature of Leucomaines formed during Sleep and

Waking.—We might therefore expect the products of the waking hours, those products which have a soporific action, to be more highly oxidized, while those of sleep, which have a stimulating action, would be rather products of reduction. The chemical constitution of these products still requires investigation, but we know that amongst the substances resulting from tissue waste there is a group of bodies closely allied to urea and uric acid. Amongst these is xanthine, the chemical constitution of which will appear from the graphic formula.

Relationship of Tea, Coffee and Cocoa to Products of Tissue Waste.—Xanthine is closely allied to theobromine, the active principle of cocoa, and caffeine of tea and coffee, for the former is dimethyl, and the latter is trimethyl xanthine. The stimulating effect upon the brain of cocoa, and to a still greater degree of tea and coffee, is universally known. This stimulating action would lead us to regard them as belonging to the class of products formed during sleep. During the waking hours we might reasonably expect that the substances formed, at least in the early part of the day, would have no narcotic action, even although they should be products of oxidation, but as the day went on the products of waste might gradually assume a more and more soporific character, until in the evening they again produced sleep. If this were so, we might naturally expect that by oxidation of some of the stimulant substances I have mentioned we might get products having no very marked physiological action, and others having a narcotic action.

Production of Narcotics from Stimulants.—This is the case, at least with caffeine, for while hydroxy-caffeine has still a stimulating action it is less powerful than caffeine, caffeine-methylhydroxide seems to have neither stimulating nor soporific action, but ethoxy-caffeine acts as a soporific instead of a cerebral stimulant like caffeine itself.

Sub-divisions of Hypnotics.—It will be noticed that in the last-mentioned substance, ethoxy-caffeine, we have a compound of a radical, belonging to the alcoholic series, with one in which ammonia plays a prominent part. These two constituents are examples of two classes of soporifics, and a convenient sub-division of the class is into (1) substances belonging to the alcoholic group ; (2) substances allied to urea or uric acid.

CHANGES IN THE BRAIN CELLS DURING SLEEP.

Let us now turn from the products of tissue waste which may act upon the brain, to consider what changes the brain cells undergo during sleep. I have already entered so fully into the subject, when speaking of anæsthetics, that all I need do now is simply to remind you that hypnotics may probably lessen the functional activity of the cerebral cells (1) by causing their protoplasm to contract, and thus interposing a barrier of paraplasm between it and the oxygen brought by the blood, and (2) by lessening the affinity of the cells for oxygen by diminishing their alkalinity, or by entering into actual combination with them for a time, and thus altering their chemical relationships. The products of tissue waste in the brain cells appear to be of acid nature and therefore lessen oxidation, but, as Preyer has suggested, lactic acid is a product of muscular waste, and if much of it be formed in consequence of violent or prolonged exertion, it will pass into the circulation and tend to lessen the alkalinity of the brain as well as other tissues, and sleep might therefore be induced by a long walk, where acid is formed in the limbs, as well as by prolonged mental work, where the acid is a product of the brain.

Carbonic Acid and Deficient Oxygen.—One of the final products of tissue waste is carbonic acid, and this likewise has a soporific and anæsthetic action. One is usually accustomed to associate carbonic acid poisoning with convulsions ; but from careful researches on this point, it would appear that these are not due to the presence of carbonic acid but to the absence of oxygen. It would thus seem that deficient oxidation in cases of suffocation produces in a few minutes intense stimulation of the nerve centres, while the lessened oxidation occurring in sleep has a similar but much slighter effect in the course of several hours. It is probable that in both cases the stimulation which gives rise in the one case to waking and in the other to convulsions is immediately caused by products of tissue waste.

Close Rooms: Sleeping in Church.—The drowsiness which comes on in a confined atmosphere is probably of complex origin, and, while external warmth may assist it and carbonic acid also be an important factor in its production, it is not unlikely that volatile poisons excreted from the lungs and skin may help to cause it. Carbonic acid in the cells of the cerebral cortex may, like other acids, lessen their affinity for oxygen, and thus in itself diminish their functional activity. But it may have a still more powerful action indirectly if certain substances are present in the blood, and more especially organic compounds containing chlorine, bromine, or iodine; for it may decompose these compounds and liberate hydrochloric, hydrobromic, or hydriodic acids within the nerve tissue itself. These will exert a much more powerful action than the carbonic acid. It is probable that some decomposition occurs when the sodium salts of an organic acid are introduced into the circulation, and thus sodium lactate may have a soporific action as well as lactic acid itself. Sodium, propionate, butyrate, and valerianate have also a narcotic action, increasing in strength with the rising number of carbon atoms contained in each.

BODIES OF THE ALCOHOLIC SERIES AS HYPNOTICS.

Alcohols.—The action of alcohol as a soporific is widely known, and the practice of taking a glass of hot water and spirits as a "night cap," is far from uncommon. The success of this plan would naturally lead one to look amongst the alcohols in the higher series for some substance which would be still more powerful, and might be given in smaller doses. The narcotic power of the alcohols increases as we ascend in the series, and the sopor induced by them is also of longer continuance. There is only one methylic and ethylic alcohol, but there are two propylic, four butylic, and eight amylic. The number of possible isomeric alcohols having the same chemical composition, though differing in constitution, increases rapidly as we ascend in the series. There are three divisions of alcohols, namely : (1) Primary, (2) secondary, and (3) tertiary, according as the carbon atom to which the hydroxyl is attached is united to one, two, or three radicals.

Amylene Hydrate.—Tertiary amyl alcohol, or, as it is often called, amylene hydrate, was recommended by Schmiedeberg as a hypnotic, and it has lately been introduced into practice by von Mering. It is said to be intermediate between chloral and paraldehyde, safer than either, and not likely to disturb the digestion. When we consider that the next number of the series above amyl, namely, hexyl, may yield thirty-eight alcohols, and that thirteen of those are actually known, we can readily see what a possible field there is for the introduction of new hypnotics.

ETHERS AS HYPNOTICS.

Methylal.—The ethers are as a rule very volatile, and are more used as anæsthetics than hypnotics. One of them, methylene-dimethyl-ether, or methylal or formal, $\begin{matrix} H \\ H \end{matrix}\!\!>\!C\!<\!\!\begin{matrix} OCH_3 \\ OCH_3 \end{matrix}$, has recently been recommended as a soporific. Its rapid elimination, however, renders it somewhat unsuitable, and in addition to this, patients appear to become very quickly accustomed to its use, so that the dose has to be constantly increased.

Sulphonal.—The chemical name of this substance is diethyl-sulphon-dimethyl-methane. This long name

shows that it consists of methane, or marsh gas, $\begin{matrix}H\\H\end{matrix}\rangle C\langle\begin{matrix}H\\H\end{matrix}$ or CH_4, in which atoms of hydrogen are replaced by methyl, CH_3, thus: $\begin{matrix}H\\H\end{matrix}\rangle C\langle\begin{matrix}CH_3\\CH_3\end{matrix}$. But this is not all, for this body only corresponds to the last half of the name, and is dimethyl methane. It resembles methylal to a certain extent, only the two methyl groups are connected directly with the carbon of the original methane instead of the connection being effected by means of oxygen in methylal. In order to complete the structure of sulphonal we must replace the other two atoms of hydrogen by ethyl: but if these were connected directly to the carbon in the same way as the two methyls are, we should get diethyl-dimethyl-methane $\begin{matrix}C_2H_5\\C_2H_5\end{matrix}\rangle C\langle\begin{matrix}CH_3\\CH_3\end{matrix}$. But in sulphonal the connection of the two ethyls is effected by the SO_2 group, which plays a part like that of O in methylal in connecting alkyls with the carbon. We thus get $\begin{matrix}C_2H_5SO_2\\C_2H_5SO_2\end{matrix}\rangle C\langle\begin{matrix}CH_3\\CH_3\end{matrix}$

Diethyl-sulphon-dimethyl-methane or sulphonal.

This appears to be one of the most effective of all the newly introduced hypnotics, and although it does not, like morphine, compel sleep, it induces sleep in a pleasant manner, and has few disagreeable after-effects and little or no danger.

ALDEHYDES AS HYPNOTICS.

Paraldehyde.—Aldehydes have a strongly irritant action upon mucous membranes, and this is a great objection to their use as hypnotics. But they have a power of uniting with themselves, or polymerising, as it is termed, and these polymeric forms are less irritant. Ethylic aldehyde unites with itself, and when three molecules of it combine it forms paraldehyde. When several molecules, the number of which is unknown, combine it forms metaldehyde. Paraldehyde forms a useful hypnotic, which does not depress the action of the heart like chloral, and does not give rise to discomfort next day. The chief objection to it is its unpleasant smell, which it imparts to the breath and which hangs about the patient for many hours.

Ketones as Hypnotics: *Hypnone.*—In aldehyde we have the group CO, attached on the one side to a radical, and on the other to hydrogen; in ketones it is attached on both sides to a radical. When this radical consists on both sides of methyl, we obtain the ketone known as acetone. This substance has received much attention on account of its having been found in the blood of diabetic patients, and it is suspected of causing diabetic coma; it produces intoxication and sleep, but it is less powerful than ether or chloroform. Lately a compound, in which the aldedyde group is attached on the one side to methyl and on the other to phenyl, has been introduced by Dujardin-Beaumetz. Its chemical name is phenyl-methyl-acetone or phenyl-methyl-ketone. It has received the name of hypnone, but as it is quite clear that a very large number of ketones may have a hypnotic action, it is much better to give each its chemical name; for we may connect any radical—ethyl, butyl, propyl, etc.—to one or both sides of the CO group, and therefore the number of possible ketones is almost innumerable. When we consider that in addition to the ketones we have great possibilities amongst the alcohols and ethers, it is evident that a large number of hypnotics may be obtained from members of the alcohol series.

HYPNOTICS RELATED TO UREA.

But there is another class of hypnotics, namely, those in which nitrogen may be said to form the basis, and which are closely allied to urea and uric acid. Urea, or carbamide, consists of two atoms of amidogen, NH_2, united to carboxyl, CO, thus: $O=C\langle\begin{matrix}NH_2\\NH_2\end{matrix}$. When one atom of amidogen is replaced by hydroxyl, OH, we get carbamic acid, thus: $O=C\langle\begin{matrix}NH_2\\OH\end{matrix}$. This acid is not capable of independent existence, but its ammoniacal salt is familiar to us under the name of carbamate of ammonia. From its composition it seemed to Schmiedeberg likely that if carbonic acid were united to an alkyl, the alkyl would still continue to exert a narcotic action, while the NH_2, if it exerted any action, would tend to stimulate like ammonia. One would thus, he hoped, be able to get a hypnotic which would produce sleep, and in place of depressing the heart like chloral, would tend rather to stimulate it. Such a drug was likely to be useful in cases where, on account of cardiac feebleness, the administration of chloral might be dangerous. He accordingly tested the compound of carbamic acid with methyl and ethyl. The latter substance is called urethane, from its relationship to urea on the one hand and ethyl on the other.

The term "urethanes" has also been given to all the members of the series in which alkyls are combined in a similar fashion with carbamic acid. The anticipations which Schmiedeberg formed have been realized, and urethane is a useful hypnotic, although not so powerful as chloral. One would imagine that urethanes containing alkyls higher in the series than ethyl would be more powerful, but unfortunately they are less soluble, and thus are rendered less active by their slow absorption.

LOCAL ANÆSTHETICS.

In sleep, and to a still greater extent in the stupor produced by anæsthetic agents, impressions made upon the body may remain unfelt, although in the waking condition they might be painful. It frequently happens that we wish to prevent pain during a slight operation, or to relieve pain from some irritation without producing general stupor, and this we can sometimes do by means of local applications.

Cause of Pain.—The feeling of pain is undoubtedly due to some condition in the cerebrum itself, although it may be impossible for us to say where it is localized.

Tactile Centre.—The tactile centre has been located by Ferrier in the hippocampal region, and very probably the sensation of pain is also located here, for in some of his experiments I have seen a monkey in which this region has been destroyed give no evidence whatever of sensation, either tactile or painful, when the skin of the opposite part of the body was touched with a piece of wire sufficiently hot to make the animal jump when applied to the other side.

Peripheral Ends and Trunks.—As a rule the sensation of pain is awakened in the cerebral centre, wherever that may be, by stimuli applied to the peripheral ends of the afferent nerves. From these it is conveyed through the nerve trunks and spinal cord to the brain. There is a marked distinction between the sensibility of the peripheral ends and of the trunks of sensory nerves, the former being much more sensitive. On this account a stimulus applied to the skin may produce well marked sensation, although a similar stimulus applied to the nerve might not.

Removal of Pain.—Pain due to irritation of any part of the sensory tract may be abolished by destroying the irritability of the part to which the irritant is applied, or the conducting power of the path by which it ought to travel to the brain.

Freezing.—One mode of producing local anæsthesia is by freezing. This can be done by ice and salt, but it is much more convenient and effective by using the cold generated during the evaporation of a volatile liquid, or, still better, of a gas which has been liquefied by cold and pressure. The spray of anhydrous ether was for a long time the most convenient form of producing local anæsthesia by the application of cold, but for two or three years back chloride of methyl compressed into iron cylinders has been found still more

convenient. Whatever the means used, however, care is necessary to avoid destroying the tissues and causing ulceration, and this method is, therefore, by no means without its disadvantages.

Carbolic Acid.—Another method is to apply to the surface some drug which will destroy the sensation, and this power is possessed in a marked degree by carbolic acid. When applied to the skin it passes through the epidermis, gives rise to a certain amount of burning, but produces such an amount of anæsthesia that boils may be opened without pain. Carbolic acid appears to have the peculiar power of irritating either peripheral ends or nerve centres, when applied to them, and also of completely destroying the power of conduction in sensory nerves, without causing any irritation in them.

Cresols.—A local anæsthetic power is also possessed by several bodies allied to carbolic acid, such as para-cresol. These substances destroy the sense of pain but they do not destroy tactile sensibility. But carbolic acid coagulates albumen, and tends, like cold, to destroy the part to which it is applied, and causes ulceration. A similar objection applies to a cresol. But there are other substances also allied to carbolic acid, which are free from this objection. The most important of these is certainly cocaine.

Cocaine.—When this substance is boiled with water it splits up, yielding methylic alcohol, benzoic acid, and another substance, ecgonine. From ecgonine cocaine can again be built up by the addition to it of the radicals benzoyl, C_6H_5 CO, and methyl, CH_3. Ecgonine has no local anæsthetic action whatever, and in this it resembles tropine, which is a product of the decomposition of atropine.

Atropine.—Atropine splits up into tropic acid, and tropine, which has no local anæsthetic action, although atropine possesses it to a certain extent; but when tropine is combined with benzoic acid instead of tropic acid, the resulting benzoyl tropine, or homatropine, has a distinct local anæsthetic action.

Benzoyl Compounds.—This fact led Filehne to suspect that the anæsthetic property in cocaine probably resided in the benzoyl rather than in the ecognine. Curiously enough, benzoyl ecgonine does not appear to have a distinct local anæsthetic action, although the addition of methyl, which converts it into cocaine, gives it this power in such an eminent degree. Yet Filehne's supposition is, to a great extent, correct, and he has found that the benzoyl derivatives of several substances have a marked local anæsthetic action. Amongst these are the benzoyl derivatives of morphine, hydrocotarnine, quinine, cinchonine, and methyl triacetonal-kanine. The latter has, next to benzoyl-tropine, most resemblance in its action to cocaine. Next comes benzoyl-quinine, and the weakest is benzoyl-morphine. Unfortunately, these substances, with the exception of benzoyl-tropine, have all an irritant action, which precedes their anæsthetic action, and when introduced into the eye they cause so much burning that they cannot be used as local anæsthetics. Benzoyl-tropine, although free from this objection, acts too much like atropine, and therefore is for many purposes inadmissible.

Anæsthetica Dolorosa.—The irritant action which a number of local anæsthetics possess has led Liebreich to divide local anæsthetics into two classes: those which cause local irritation and pain and those which do not. In a letter to the *Lancet*, I suggested that most of the substances belonging to the group of cardiac poisons, like digitalis, might have a local anæsthetic action. At that time I was unaware that they had nearly all been tested and found to have such an action by Professor Hoppe. However, they nearly all cause more or less irritation before producing their anæsthetic action, and are practically not available.

(*To be continued.*)

ROYAL INSTITUTION OF GREAT BRITAIN.

ALUMINIUM.*

BY SIR HENRY ROSCOE, M.P., D.C.L., LL.D., V.P.R.S.

(*Concluded from page* 57.)

Aluminium Manufacture.

I now come to the final stage of the process, viz., the reduction of the pure double chloride by sodium. This is effected, not in a tube of Bohemian glass, as shown in Mr. Barlow's lecture in 1856, but in a large reverberatory furnace, having an inclined hearth about 6 feet square, the inclination being towards the front of the furnace, through which are several openings at different heights. The pure chloride is ground together with cryolite in about the proportions of two to one, and is then carried to a staging erected above the reducing furnace. The sodium, in large slabs or blocks, is run through a machine similar to an ordinary tobacco-cutting machine, where it is cut into small thin slices: it is then also transferred to the staging above the reducing furnace.

Both materials are now thrown into a large revolving drum, when they become thoroughly mixed. The drum being opened and partially turned, the contents drop out into a car on a tramway directly below. The furnace having been raised to the desired temperature, the dampers of the furnace are all closed to prevent the access of air, the heating gas also being shut off. The car is then moved out on the roof of the furnace until it stands directly over the centre of the hearth. The furnace roof is provided with large hoppers, and through these openings the charge is introduced as quickly as possible. The reaction takes place almost immediately, and the whole charge quickly liquefies. At the end of a certain time the heating gas is again introduced and the charge kept at a moderate temperature for about two hours. At the end of this period the furnace is tapped by driving a bar through the lower opening, which has previously been stopped with a fire-clay plug, and the liquid metal run out in a silver stream into moulds placed below the opening. When the metal has all been drawn off, the slag is allowed to run out into small iron wagons and removed. The openings being again plugged up, the furnace is ready for another charge. From each charge, composed of about 1,200 lbs. of pure chloride, 600 lbs. of cryolite, and 350 lbs. of sodium, about 115 to 120 lbs. of aluminium is obtained.

The purity of the metal entirely depends upon the purity of the chloride used, and without exercising more than ordinary care the metal tests usually indicate a purity of metal above 99 per cent. On the table is the metal run from a single charge. Its weight is 116 lbs., and its composition, as shown by analysis, is 99·2 aluminium, 0·3 silicon, and 0·5 iron. This I believe to be the largest and the purest mass of metal ever made in one operation.

The result of eight or nine charges are laid on one side, and then melted down in the furnace to make a uniform quality, the liquid metal, after a good stirring, being drawn off into moulds. These large ingots, weighing about 60 lbs. each, are sent to the casting shop, there to be melted and cast into the ordinary pigs, or other shapes, as may be required for the making of tubes, sheets, or wire, or else used directly for making alloys of either copper or iron.

The following table shows approximately the quantity of each material used in the production of one ton of aluminium:—

Metallic sodium	6,300 lbs.
Double chloride	22,400 „
Cryolite	8,000 „
Coal	8 tons.

* Read at a Weekly Evening Meeting, Friday, May 3.

To produce 6,300 lbs. of sodium is required :—

Caustic soda	44,000 lbs.
Carbide made from pitch, 12,000 lbs., and iron turnings 1,000 lbs.	7,000 lbs.
Crucible castings	2½ tons.
Coal	74 tons.

For the production of 22,400 lbs. double chloride is required :—

Common salt	8,000 lbs.
Alumina hydrate	11,000 „
Chlorine gas	15,000 „
Coal	180 tons.

For the production of 15,000 lbs. of chlorine gas is required :—

Hydrochloric acid	180,000 lbs.
Limestone dust	45,000 „
Lime	30,000 „
Loss of manganese	1,000 „

It might seem, on looking over the above numbers, as if an extraordinary amount of waste occurred, and as if the production is far below that which ought to be obtained, but a study of the figures will show that this is not the case. I would wish to call attention to one item in particular, viz., fuel, it having been remarked that the consumption of coal must prevent cheap production. I think when it is remembered that coal, such as used at the works, cost only 4s. per ton, while the product is worth £2,240 per ton, the cost of coal is not an item of consequence in the cost of production. The total cost of the coal to produce one ton of metal being £50, the actual cost for fuel is less than sixpence for every pound of aluminium produced. The ratio of cost of fuel to value of product is indeed less than is the case in making either iron or steel. In concluding my remarks as to the method of manufacture and the process in general, I may add that I do not think it is too much to expect, in view of the rapid strides already made, that in the future, further improvements and modifications will enable aluminium to be produced and sold even at a lower price than appears at present possible.

Properties of Aluminium.

In its physical properties aluminium widely differs from all the other metals. Its colour is a beautiful white, with a slight blue tint. The intensity of this colour becomes more apparent when the metal has been worked, or when it contains silicon or iron. The surface may be made to take a very high polish, when the blue tint of the metal becomes manifest, or it may be treated with caustic soda and then nitric acid, which will leave the metal quite white. The extensibility or malleability of aluminium is very high, ranking with gold and silver if the metal be of good quality. It may be beaten out into thin leaf quite as easily as either gold or silver, although it requires more careful annealing.

It is extremely ductile and may be easily drawn, especial care only being required in the annealing.

The excessive sonorousness of aluminium is best shown by example (large suspended bar being struck). Faraday has remarked, after experiments conducted in his laboratory, that the sound produced by an ingot of aluminium is not simple, and one may distinguish the two sounds by turning the vibrating ingot.

After being cast it has about the hardness of pure silver, but may be sensibly hardened by hammering.

Its tensile strength varies between 12 and 14 tons to the inch (test sample which was shown having been broken at 13 tons, or 27,000 lbs.), ordinary cast iron being about 8 tons. Comparing the strength of aluminium in relation to its weight, it is equal to steel of 38 tons tensile strength. The specific gravity of cast aluminium is 2·58, but after rolling or hammering this figure is increased to about 2·68.

The specific gravity of aluminium being 1, copper is 3·6, nickel 3·5, silver 4, lead 4·8, gold 7·7.

The fusibility of aluminium has been variously stated as being between that of zinc and silver, or between 600 to 1000° C.

As no reliable information has ever been made public on this subject, my friend, Professor Carnelley, undertook to determine it. I was aware, from information gained at the works at Oldbury, that a small increase in the percentage of contained iron materially raised its point of fusion, and it has been undoubtedly due to this cause that such wide limits are given for the melting point. Under these circumstances two samples were forwarded for testing, of which No. 1, containing ½ per cent. of iron, had a melting point of 700° C.; whereas No. 2, containing 5 per cent. of iron, does not melt at 700° and only softens somewhat above that temperature, but undergoes incipient fusion at 730°.

According to Faraday, aluminium ranks very high among metallic conductors of heat and electricity, and he found that it conducted heat better than either silver or copper. The specific heat is also very high, which accounts for length of time required for an ingot of the metal to either melt or get cold after being cast.

Chemically, its properties are well worthy of study.

Air, either wet or dry, has absolutely no effect on aluminium at the ordinary temperature, but this property is only possessed by a very pure quantity of metal, and the pure metal in mass undergoes only slight oxidation even at the melting point of platinum.

Thin leaf, however, when heated in a current of oxygen, burns with a brilliant, bluish-white light. If the metal be pure, water has no effect on it whatever, even at a red heat. Sulphur and its compounds also are without action on it, while, under the same circumstances, nearly all metals would be discoloured with great rapidity.

Dilute sulphuric acid and nitric acid, both diluted and concentrated, have no effect on it, although it may be dissolved in either hydrochloric acid or caustic alkali. Heated in an atmosphere of chlorine it burns with a vivid light, producing aluminium chloride. In connection with the subject it may be of interest to state the true melting point of the double chloride of aluminium and sodium, which has always been given at 170° to 180° C., but which Mr. Baker, the chemist to the works, finds lies between 125° and 130° C.

Uses of Aluminium.

Its uses, unalloyed, have heretofore been greatly restricted. This is, I believe, alone owing to its former high price, for no metal possessing the properties of aluminium could help coming into larger use if its cost were moderate. Much has been said as to the impossibility of soldering it being against its popular use, but I believe that this difficulty will now soon be overcome. The following are a few of the purposes to which it is at present put :—Telescope tubes, marine glasses, eyeglasses and sextants, especially on account of its lightness. Fine wire for the making of lace, embroidery, etc. Leaf in the place of silver leaf, sabre sheaths, sword handles, etc., statuettes and works of art, jewellery and delicate physical apparatus, culinary utensils, harness fittings, metallic parts of soldiers' uniforms, dental purposes, surgical instruments, reflectors (it not being tarnished by the products of combustion), photographic apparatus, æronautical and engineering purposes, and especially for the making of alloys.

Alloys of Aluminium.

The most important alloys of aluminium are those made with copper. These alloys were first prepared by Dr. Percy, in England, and now give promise of being largely used. The alloy produced by the addi-

tion of 10 per cent. of aluminium to copper, the maximum amount that can be used to produce a satisfactory alloy, is known as aluminium bronze. Bronzes, however, are made which contain smaller amounts of aluminium, possessing in a degree the valuable properties of the 10 per cent. bronze. According to the percentage of aluminium up to 10 per cent., the colour varies from red-gold to pale yellow. The 10 per cent. alloy takes a fine polish, and has the colour of jewellers' gold. The 5 per cent. alloy is not quite so hard, the colour being very similar to that of pure gold.

To arrive at perfection in the making of these alloys, not only is it required that the aluminium used should be of good quality, but also that the copper must be of the very best obtainable. For this purpose only the best brands of Lake Superior copper should be used. Inferior brands of copper or any impurities in the alloy give poor results. The alloys all possess a good colour, polish well, keep their colour far better than all other copper alloys, are extremely malleable and ductile, can be worked either hot or cold, easily engraved, the higher grades have an elasticity exceeding steel, are easily cast into complicated objects, do not lose in remelting, and are possessed of great strength, dependent, of course, on the purity and percentage of contained aluminium. The 10 per cent. alloy, when cast, has a tensile strength of between 70,000 and 80,000 lbs. per square inch, but when hammered or worked, the test exceeds 100,000 lbs. (A sample shown broke at 105,000 lbs.)

An attempt to enumerate either the present uses or the possible future commercial value of these alloys is beyond my present purpose. I may, however, remark that they are not only adapted to take the place of bronze, brass, and steel, but they so far surpass all of those metals, both physically and chemically, as to make their extended use assured.

But even a more important use of aluminium seems to be its employment in the iron industry, of which it promises shortly to become a valuable factor, owing to certain effects which it produces when present, even in the most minute proportions. Experiments are now being carried on at numerous iron and steel works in England, on the Continent, and in America. The results so far attained are greatly at variance, for whilst in the majority of cases the improvements made have encouraged the continuance of the trials, in others the result has not been satisfactory. On this point I would wish to say to those who may contemplate making use of aluminium in this direction, that it would be advisable before trying their experiments to ascertain whether the aluminium alloy they may purchase actually contains any aluminium at all, for some of the so-called aluminium alloys contain little or no aluminium, and this may doubtless account for the negative results obtained. Again, others contain such varying proportions of carbon, silicon, and other impurities, as to render their use highly objectionable.

It seems to be a prevailing idea with some people, that because aluminium is so light compared with iron, that they cannot be directly alloyed, and furthermore, that for the same reason, alloys made by the direct melting together of the two metals would not be equal to an alloy where both metals are reduced together. Now, of course, this is not the case, and the statement has been put forward by those who were only able to make the alloys in one way.

Aluminium added to molten iron and steel lowers their melting points, consequently increases the fluidity of the metal, and causes it to run easily into moulds and set there, without entrapping air and other gases, which serve to form blow-holes and similar imperfections. It is already used by a large number of steel founders, and seems to render the production of sound steel castings more certain and easy than is otherwise possible.

One of the most remarkable applications of this property which aluminium possesses of lowering the melting-point of iron has been made use of by Mr. Nordenfelt in the production of castings of wrought iron.

Aluminium forms alloys with most other metals, and although each possess peculiar properties which in the future may be utilised, at present they are but little used.

CHEMICAL SOCIETY.

A meeting of the Chemical Society was held on Thursday, June 20. Dr. W. J. Russell, F.R.S., President, in the chair, when the following papers were read:—

Observations on the Melting Point of some Salicylic and Anisic Compounds. By W. H. PERKIN, Ph.D., F.R.S. —The author, after referring to his paper published in the Journal of the Society in 1867, in which methylated and ethylated salicyl aldehydes are described as nearly colourless fluids which do not solidify when cooled in a freezing mixture, and to the apparently contradictory results of Voswinckel (*Ber.*, 1882, 2024) —who states that methylated salicyl aldehyde is a solid melting at 35°—points out the curious fact that, although this latter aldehyde does not easily crystallize in a freezing mixture, it can be made to do so; the crystals, however, melt at about 2·7—3°. On evaporating an ethereal solution of the aldehyde, he obtained prismatic crystals, having the melting point given by Voswinckel, and it was found that if the oily aldehyde be touched with one of these it immediately becomes a solid mass having a melting point of 35°. On re-melting this solid and then cooling in a freezing mixture, crystals melting at 2·7—3° can again be obtained. It is therefore established that methylated salicyl aldehyde forms crystals of two kinds, having melting points differing by about 32°. Ethylated salicyl aldehyde can also be made to crystallize; the crystals melt at about 6° or 7°. Anisic aldehyde also crystallizes when cooled; although a para-compound, it melts at a lower temperature than either modification of methyl salicyl aldehyde, viz., at 0·02°. Ethylic anisate easily crystallizes (m. p. = 7°), but ethylic methylsalicylate has not as yet been obtained in a crystalline condition.

The Action of Propionyl and Butyryl Chloride on Phenol. By W. H. PERKIN, Ph.D., F.R.S.

The Nature of Solutions as Elucidated by a Study of their Freezing Temperatures. By S. U. PICKERING.—A series of determinations of the freezing temperatures of mixtures of sulphuric acid and water was undertaken in order to obtain further confirmation of the existence in solution of the various hydrates which had been indicated by the densities, heat of dissolution, heat capacity and electric conductivity of these solutions, as well as to throw some light on Raoult's method of determining molecular weights. The determinations with solutions containing over 4 per cent. H_2SO_4 were attended with considerable difficulty, as the solution does not freeze, but one of its constituents crystallizes out, the change being identical in nature with the crystallization of a salt from a saturated solution; what has to be determined, therefore, is the temperature at which the given solution becomes saturated. This was done by cooling the liquid down till a good crop of crystals was obtained; it was then put in a vessel of water, and the rise of temperature noted at every half minute; the temperature at which the last crystals had disappeared was signalized by a sudden alteration in the rate of this rise. The author has, so far, plotted the results against percentage composition. The general results are represented by three independent curves, in which

water, $H_2SO_4 \cdot H_2O$, and H_2SO_4, itself are the substances which crystallize out. The first of these curves is represented by an approximately straight line as far as 8 or 9 per cent. H_2SO_4, falling at the rate of about 0·5° for every 1 per cent.; it then curves rapidly downwards, the crystallizing temperature of a 30 per cent. solution being 36°; a little beyond this point it appears to become almost vertical. From 30 to 77 per cent. no freezing points have been attained. At this latter strength the crystallization of the monohydrate begins. This crystallization is represented by a curve with two branches, having its highest point at 84·5 per cent. (the composition of $H_2SO_4 \cdot H_2O$) and 8·5°, and falling away from this point on either side, at first gradually, and then abruptly. At about 94 per cent. this curve meets that representing the crystallization of H_2SO_4, the temperature being—31°; the H_2SO_4 curve rises from this point in an approximately straight line up to 100 per cent. and 10·35°, when it turns abruptly down again in a curvilinear direction, the determinations having been extended as far as 101 per cent. A closer inspection of these several curves shows that none of them are continuous, but that they are made up of separate curves or straight lines, which seem to be quite independent of each other, and show breaks of a most marked character, often corresponding to differences five or ten times greater than the experimental error. These breaks occur in every case at the same points as those observed by the author in the densities and other properties, and are of a very much more certain character than in any of the other cases. Of the 17 hydrates of sulphuric acid which he previously indicated, 12 are very satisfactorily confirmed by the present observations; the other five (H_2SO_4 with 2, 4, 5, 9 and 13 H_2O) would be shown only in that portion of the diagram where no freezing points have yet been reached. In addition to this, there appears to be three other breaks, which the previous work would have been insufficient to show, at 98·7, 86, and 82·5 per cent., corresponding to $12\,H_2SO_4 \cdot H_2O$, $7(H_2SO_4 \cdot H_2O) \cdot H_2SO_4$, and $7(H_2SO_4 \cdot H_2O) \cdot H_2O$, as well as a break at 100·7 per cent., representing $27\,H_2SO_4 \cdot SO_3$, and at 100 per cent., or H_2SO_4 itself. It is especially noteworthy that the breaks at the extreme end of the curve corresponding to H_2SO_4 with 500, 1400 and 5000 H_2O have been fully confirmed. The marked character of these breaks (which are apparent without any differentiation) leads to the hope that the method may be applicable in the case of solutions of organic liquids where other methods would fail. Each of the three main curves which represent the general results tend downwards at an increasing rate as we pass from the highest points in them, and this tendency would also be exhibited if the results were plotted against molecular instead of percentage composition. This, the author shows, is what their character should be if hydrates were formed in solution, whereas on the physical theory of solution, they should tend downwards at a diminishing rate; so that the general form of the curves, independent of there being breaks in them, is conclusive in favour of the hydrate theory. Passing on to the bearing of these results on Raoult's method, the author repeats his assertion that, at the best, this method could only give us the molecular weights of substances in the gaseous condition at the temperature of the determination; for in dilute solutions the molecules of the dissolved substance are as far removed from each other as they are when vaporized. There are, however, no theoretical considerations which justify our regarding the molecular weight thus obtained in the same light as that obtained from vapour-densities. The vapour-density is a constant within experimental error throughout a very long range of conditions, whereas the lowering of the freezing point could only be a constant on the supposition that dissolution is entirely physical and that the dissolved molecules act independently of the solvent. The present results show that it is not a constant, and that we have no grounds for supposing it to be such even with extremely dilute solutions. The irregularities and breaks which characterize the whole results have been traced back as far as a 0·1 per cent. solution, and a further extension of the determinations, if possible, would simply reveal a continuation of these irregularities. On the other hand, it must be admitted, as, indeed, the practical results prove, that these irregularities would often lead to no great error in the molecular weight found, provided the solutions used are not too strong. The author shows that such would be the case with the sulphuric acid curves, when the crystallization of water is used to determine the molecular weight of H_2SO_4, or that of sulphuric acid to determine the molecular weight of H_2O. But the case is otherwise when we use the crystallization of the monohydrate to determine the molecular weight of H_2SO_4 on the one hand and H_2O on the other. Within 5 per cent. of $H_2SO_4 \cdot H_2O$ we should get results such as 18 for H_2SO_4 and 6 for H_2O. This shows that, although Raoult's method may give approximately correct results in many cases, we can never rely on it without performing an extensive series of experiments. There are no theoretical considerations which would lead us to suppose that it is reliable, and this investigation proves that each case has peculiarities of its own, which may lead to an entirely erroneous molecular weight.

(*To be concluded.*)

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Coumarin in the Vegetable Kingdom.

Sir,—As one whose work chiefly lies in the investigation of economic vegetable products, I am grateful to you for your publication of Messrs. Schimmel and Co.'s valuable notes. I observe in the *Pharmaceutical Journal* of April 20 they quote H. Lojander on the distribution of coumarin in the vegetable kingdom. Scores of Australian indigenous plants smell strongly of coumarin, while the bark of a large tree, *Ceratopetalum apetalum*, D. Don., belonging to the Saxifrageæ, reeks with it. I see you have an *Alyxia* in your list; allow me to add *A. buxifolia*, P. Br., common enough in Tasmania, Victoria and New South Wales, whose wood smells so sweetly of coumarin as to bear the local name of "Tonga-bean wood."

Technological Museum, Sydney. J. H. Maiden.

J. Morcombe.—(1) *Agrimonia eupatoria.* (2) *Nepeta Cataria.* (3) *Stellaria media.* (4) *Chærophyllum temulum.* (5) *Epilobium montanum.* (6) *Campanula Trachelium.*

A. A.—(1) Not sent. (2) *Calluna vulgaris.* (3) *Erica cinerea.* (4) *Erica tetralix.*

Ornis.—We have been unable to trace the work in the catalogues to which we have access.

Revilo.—*Vanessa urticæ* and *Pterophorus platadactylus.*

"*Safe.*"—The name to which you refer has now been included in the British Pharmacopœia as an official synonym. The application of it, therefore, to any other preparation might lead to some inconvenience.

W. J. Shepperd.—*Pyrus fennica.*

J. W. Morrison.—We have been unable to find such a formula.

Inquirer.—The difficulty in dispensing the prescriptions is due to the formation of hydriodate of quinine. The object of the prescriber would have been better attained by the use of hydriodate of quinine.

Communications, Letters, etc., have been received from Messrs. Slinn, Clague, Bennett, Morrison, Inquirer.

ASHBY DE LA ZOUCH AS A HEALTH RESORT.

THE pleasant little midland town of Ashby de la Zouch is well-known to readers of Ivanhoe as having been the scene of those brilliant tournaments of the Middle Ages which are so well described in that work. The fame of Ashby on that account is a thing of the past, but at the present day the town has the advantage of possessing an abundant supply of "healing waters," the efficacy of which in the alleviation of certain forms of disease has of late years acquired considerable repute. In this respect Ashby de la Zouch has come to be of importance as a health resort for those who are troubled with gout or rheumatism, scrofulous affections or chronic skin diseases and general debility. The water to which it owes this distinction is derived from the carboniferous strata at Moira, and was discovered so recently as the year 1805 issuing from a depth of some 700 feet below the surface, and its healing qualities were soon found to be so great that an hotel and bath establishment were erected at that place for the convenience of patients. Shortly afterwards it was considered desirable to provide better and more extensive facilities for the use of this water, and the matter having been taken in hand by the Marquis of Hastings and his agent Mr. Mammatt, the result was the building in 1826 of a bathing establishment at Ashby, to which place the mineral water was conveyed from the spring at Moira. This building has recently undergone considerable alterations and additions: it is now fitted up on the most improved principle with all the modern appliances for proper and varied administration, and about a year ago its re-opening was formally celebrated.

The water with which the baths are supplied is highly impregnated with alkaline salts, approximating in character to some brine springs. According to an analysis recently made by Dr. B. H. Paul it contains nearly 1800 grains of saline contents in the gallon; the composition of which is stated in his report to be as follows:—

	Grains per gallon.
Sodium chloride	1312·23
Potassium chloride	8·22
Calcium sulphate	175·69
Aluminum sulphate	1·59
Calcium chloride	156·22
Magnesium chloride	116·99
Magnesium bromide	3·89
Calcium carbonate	4·62
Iron carbonate	6·09
Manganese carbonate	2·52
Silica	0·56
Total saline contents	1788·62

On evaporating the water the separation of the saline contents soon commences, and by exposure to the atmosphere a ferruginous deposit is formed in consequence of the peroxidation of the ferrous carbonate present in solution. The water is not quite so highly charged with saline ingredients as some kinds of natural brine; but it contains a larger amount of them than most of the mineral waters which are celebrated for their medicinal qualities. The amount of sodium chloride, the predominating ingredient, is nearly equal to that contained in sea water, and the amount of magnesium bromide is also considerable. In addition to other calcareous and magnesium salts, the water contains calcium carbonate and the carbonates of iron and manganese, which are held in solution by carbonic acid gas, of which the gallon contains more than 19 cubic inches. The large amount of magnesium salts associated with alkaline chlorides in this water is an important factor of its value as a medicinal agent, and it points to the efficacy of the water being analogous to that of the Pullna and Kreutznach waters. Judging of it by comparison of its composition with that of other kinds of mineral water which possess high repute for their remedial efficacy in the treatment of gout and rheumatic or scrofulous affections, it seems that the water of Ashby-de-la-Zouch must be eminently suitable for such purposes and at least as efficacious as many of the mineral waters that have long been regarded by medical authorities as valuable curative agents.

The bath establishment is a handsome building in the Grecian style, with a front colonnade 150 feet long. The centre of the building is entered by a broad flight of steps leading through a fine portico to a hall, which is used as a ball room. Two similar entrances at each end of the building lead to the two wings containing the bath rooms. Each wing has six baths, with separate dressing rooms and every convenience for shower needle and douche application. There is also an excellent swimming bath 50 feet long, and it is proposed to add a Turkish bath. The whole building is heated by steam pipes, so that an equable and comfortable temperature can always be maintained at all seasons of the year, and there are arrangements of steam pipes for heating the water used in the baths as may be required. The grounds attached to the bathing establishment are tastefully laid out with walks and ornamental trees so as to form a pleasant garden, besides which there are several tennis courts, an archery ground, and a bowling green. For those who require to devote their attention to the serious business of bodily recuperation, these attractions, with the quiet repose of the place, will suffice to compensate for the lack of the more stirring amusements of larger towns. The country round Ashby is also very attractive, not only on account of its natural beauty, but also from the number of country mansions it contains, and by offering to the geologist and antiquarian abundant opportunity for pursuing the studies in which they delight.

About six miles to the east of Ashby lies the beautiful range of hills called Charnwood Forest, the drive to which is most enjoyable. There are many other interesting places in the neighbourhood which claim the attention of the visitor, such as Gracedieu, with its ancient monastical ruins; the monastery of Mount St. Bernard in full monastic life, and Bardon Hill, a conspicuous elevation with beautiful wooded slopes, from the summit of which is obtained a view of some of the finest landscape scenery in Leicestershire aud the adjoining counties. Lastly it must be mentioned that there is attached to the grounds of the bathing establishment an excellently equipped hotel belonging to the Baths Company, where every convenience is provided for residence in immediate proximity to the baths, to which access is obtained by a private entrance.

The town of Ashby is situated on the line of

railway connecting Leicester with Burton-on-Trent. It is three hours' journey from London, 21 miles from Leicester, 14 from Derby, and 9 miles from Burton. The town stands at an elevation of 400 feet above the sea level, and is for the most part built on the slope of two hills, so that its position as regards efficient drainage is very favourable. For several years past the local Board of Health has been careful to perfect the sanitary conditions by introducing the most recent improvements in drainage and water supply. The report of the medical officer of health for the year 1887 shows that the small rate of mortality affords strong evidence of the salubrity of the town. Of the 81 deaths registered during the year, 15 occurred in the Union workhouse. The remaining number of 66 in the rest of the urban district with a population of nearly 5000 shows a favourable percentage. A large proportion of the deaths were due to old age, while there was not a single death from zymotic disease. The general healthy condition of a watering place is one of the conditions most necessary to be taken into account by all intending visitors, and more particularly by those who resort to such places for the improvement of their health or to undergo special medical treatment. In this respect some of the places on the Continent which are famous for their mineral water are highly defective. The sanitary arrangements of the houses and of the towns are often of a primitive character and the partial introduction of improvements of them are not always advantageous. So much is this the case that many medical men are of opinion that considerable risk is thus incurred by weakly persons of contracting diseases more serious than those for which they seek relief at foreign watering places. One of the chief objects of attraction at Ashby is the ruin of the ancient castle, which was finally destroyed in 1648, after having been surrendered to the Parliamentary forces three years previously. The portions still remaining suffice, however, to give an idea of its original stateliness and extent. Another place of interest is the tournament field, situated at some little distance from the town near the old-fashioned village of Smisby.

One of the most important conditions in the use of baths for remedial purposes is the experienced guidance of a medical adviser, and the proprietors of the baths have for that reason appointed as consulting physician to the Baths Company Dr. C. R. Williams, a local practitioner who has given considerable attention to the use of the Ashby water for various complaints. In this respect the system obtaining at bathing places on the Continent has been wisely imitated, and patients who have recourse to the "healing waters" of Ashby de la Zouch can therefore rely upon having not only the full benefit of the baths but also skilled advice as to the proper mode of using them to suit their particular requirements. It may therefore be expected that the use of these baths will be greatly extended for the general good, and as the facilities for reaching Ashby from various parts of the country are likely to be still more ample than they are even now, it is not unreasonable to expect that before many years have passed the Ashby mineral water will be widely celebrated for the cure of disease, and that the bath establishment of Ashby will take high rank as a health resort.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 45.)

If there be one case in the present Paris Exhibition containing material that threatens to affect more than any other the future of British chemical industry, it is that of Pechiney and Co., of Salindres and other places. It has been well understood for some years past that as an economical method of producing soda the "ammonia" process presents great advantages over that of Leblanc, and that notwithstanding all the improvements that have been made in the latter, which have left it at the present time an almost theoretically perfect process, if it were not for its value as a source of the once useless bye-product, chlorine, it would have to be discarded. As is known, in the ammonia process the chlorine remains locked up in a waste calcium compound, which hitherto has baffled all attempts to utilize it economically. In the meantime chemists have been looking in other directions for cheap chlorine, and among other compounds magnesium chloride has been the subject of many experiments. Of this material an abundance is available in the mother liquors from the *salines* as well as those from the Stassfurt salt industry. The latter, indeed, are practically cold saturated solutions of magnesium chloride, and the quantity left as residue yearly is estimated to contain about 200,000 tons of $MgCl_2$. This would represent, if all were available, 150,000 tons of chlorine, or more than is contained in all the chlorinated compounds produced in a year in this country and on the continent combined. Moreover the economical utilization of this compound as a source of chlorine would probably be quickly followed by a modification of the ammonia process by which magnesium chloride would be obtained as a bye-product instead of calcium chloride. It has long been known that an aqueous solution of magnesium chloride can, without alteration, be concentrated by heating to the point at which the relation stands at one molecule of the chloride to six molecules of water, and that if the concentration be carried further decomposition takes place, with formation of hydrochloric acid in proportion varying with the conditions of the experiment. Attempts to obtain hydrochloric acid industrially in this way were made, but had to be abandoned on account of the damage done to the furnaces by the concentrated solutions operated upon. In 1881 the late Mr. Weldon conceived the idea of adding to the concentrated solution of magnesium chloride sufficient magnesia to form an oxychloride and then treating by heat and air solid masses of the resulting product. The results were sufficiently promising to attract the attention of Pechiney and Co., who get enormous quantities of magnesium chloride liquor left as a bye-product in the manufacture of salt from sea-water, and in experimenting on a large scale it was found that proceeding on these lines under certain conditions as much as one-half of the chlorine contained in the magnesium chloride could be obtained, if desired, in the free state. The construction of the apparatus for carrying out the operation on a manufacturing scale has been a serious problem for the engineer as well as the chemist, but it is claimed that it has now been solved, and a beautifully-made model of the furnace used in the decomposition of the oxychloride may be seen in the out-of-the-way place in

a gallery in the machinery hall where chemical and pharmaceutical manufacturing apparatus is located. In fact this appears to be the only part of the apparatus yet in practical use, since the Weldon-Pechiney process is at present limited to the production of chlorine from hydrochloric acid. For this purpose magnesium oxide is dissolved in hydrochloric acid to form the oxychloride, which is dried and roasted at a high temperature. It is claimed that this process is considerably more economical than the old Weldon process, one reason being that a much larger proportion of the chlorine is obtained free. At any rate it is stated that already the manufacture of chlorine by this process at Salindres amounts to one ton daily, with a prospect that before the year is out the output will reach six tons daily. This looks unpromising enough for the North country alkali makers, but should the obstacles, consisting chiefly in the expensiveness of the plant, now standing in the way of working with magnesium chloride be removed, it would probably give the *coup de grâce* to the Leblanc soda industry. In the opinion of a German contemporary the result would be to make the chlorine manufacture at once a monopoly of the Stassfurt district; but here the wish is evidently father to the thought, for it is not probable that Pechiney and Co., and others similarly circumstanced, would miss the opportunity, if there were one, of utilizing the residues from the *saline* industry. From this rather long prelude it will be seen how much of interest and importance may lie in an exhibit that presents no specially attractive feature to the casual observer beyond the ordinary items of a chemical manufacturer's exhibit. These are made up of pyrites, salt from sea-water and products of the mother liquors, various potassium, sodium, and magnesium salts, and samples of magnesium oxychloride, the starting-point of the new industry. In addition there is a display of aluminium in ingots and sheets, accompanied by a number of aluminium compounds, in the production of which bauxite has been the material used.

Similarly, in Solvay and Co.'s case in the French court there are various products of the evaporation of sea-water from the Varangéville saline, mineral phosphates, soda salts produced by the ammonia process, and caustic soda derived from them, together with hydrochloric acid recovered from the residual calcium chloride. In the light of what has just been said it will be seen that the last-mentioned item may have great significance, but no information is vouchsafed as to the relation the cost of recovering the acid from this waste material bears to its market value. In another special "pavilion" are additional exhibits from this firm and different establishments working the Solvay patents. Several other alkali manufacturers, some of them deriving their supplies of salt from *salines* on the coast, show specimens of their products in the French court; Brunner, Mond and Co., of Nantwich, also exhibit products by the ammonia process in the British Court, together with sulphate of ammonia, presumably obtained by the process recently described by Mr. Mond (see before, p. 34), and there are a few exhibits in the Belgian Court. But nothing else very special was noticed, and it is not worth while to simply catalogue names. In some cases nitric acid and sulphuric acid and sulphates are also shown, and there is a good display of pyrites from different sources. The Rio-Tinto Company fully illustrates the products obtained from pyrites, showing, besides sulphuric acid and sulphates, ingots of copper and silver, and zinc salts. Crude and refined sulphur are shown in the case of L. Chambon, of Marseilles, including a greenish-yellow powder, labelled "sublimé sulfaté." But the most interesting sulphur exhibits are those of Chance Brothers, of Birmingham, and the Saint-Gobain Company, since they illustrate the products recoverable from the alkali "waste" by the latest process of Chance and Claus, together with sulphuric acid free from arsenic manufactured from the regenerated sulphur. This process, it will be remembered, consists of two stages. In the first, the alkali waste is submitted to the action of kiln gas, by which it is decomposed, the products being sulphuretted hydrogen and calcium carbonate. In the second stage, the sulphuretted hydrogen is mixed with a regulated quantity of air and made to pass through a layer of anhydrous oxide of iron. When the quantity of air is just sufficient to combine with the hydrogen of the sulphuretted hydrogen, the products of the reaction that takes place are vapour of water and free sulphur; the latter being volatilized by the heat generated passes on and is obtained in the fused or the sublimed form according to the temperature of the kiln and depositing chambers. The St. Gobain Company also exhibits selenium obtained from pyrites. The alum industry appears to be represented only by French manufacturers. Fine crystals of potash alum are shown by Pommier and Co., of Gennevilliers, together with a soluble double sulphate of aluminium and calcium, and aluminium sulphate, nitrate, acetate, oxalate and hydrochlorate, the last-mentioned being used in the purification of wool. Potash and ammonia alum and sulphate of iron are exhibited by Marguerite-Delacharlonny, of Aisne, and in the case of Noel and Co., of Noyon, in addition to alum and other aluminium compounds, there is a substance, having the appearance of a yellow fat, labelled "trisulphide of carbon." Sulphates of copper and zinc are shown by Labarre and Co., of Montreuil-sous-Bois, but the most interesting feature in this case is a series of sulphites, bisulphites and hydrosulphites; especially attention will be attracted to a very fine crystallization of bisulphite of calcium. Before leaving this part of the subject reference should be made also to the exhibits of potassium salts derived from animal and vegetable materials. Potassium carbonate and caustic potash derived from "suint" are shown in the case of Holden and Son, of Croix, together with samples of wool fats operated upon. Potassium salts recovered from the residues of the beet industry are exhibited by E. Porion, of Wardrecques, and Dècle and Co., of Rocourt. The kelp industry also contributes its quota of potassium salts, as well as a fine show of iodine, iodides and bromides, in the collective exhibit of Levasseur and Co. and associated firms resident in the Finisterre department. Antimony and antimonial compounds, prepared from minerals derived from the Cassagnas and Martinet mines in the Auvergne department, are to be seen in the case of E. Beau, of Alais; the metal is shown in large masses, well illustrating by the crystalline texture of the surface the form known as "regulus antimonii stellatus." In the

case of Tassy de Montluc, of Bar-le-Duc, the slow formation of carbonate of lead is demonstrated by means of specimens of metal that have been subjected to the action of the acid for one, three, and five days respectively, at the end of which time a thin sheet of lead is nearly eaten through, but the process requires about thirty days for its completion. Cobalt and nickel compounds prepared from New Caledonia minerals are shown by the Société anyonyme de produits chimiques, of Paris, including cobalt, oxide, phosphate, sulphate and nitrate, double nitrite of cobalt and potassium, or "cobalt yellow," and nickel sulphate. Tin salts are also shown by the same firm, and in one or two other cases. G. Meier, of Madrid, exhibits a mineral from the Carthagena mines, which is said to yield 53 per cent. of manganese. In the Russian court there is an exhibit by Auerbach and Co. of cinnabar mineral from a mine in the Bakmouth district in Central Russia. The yield of mercury from this mineral is given as 70 kilograms per ton, and although the deposit was only discovered in 1879, and worked for the first time in 1887, the production of mercury last year is said to have amounted to 160,000 kilograms, with a possibility of that quantity being doubled in 1889. For chromium compounds the visitor must go to the British court, where will be found the really beautiful exhibits of the Eglington Chemical Company and Stevenson, Carlile and Co., both of Glasgow. In these cases may be seen the metal chromium, chromite, and a magnificent series of bichromates, chromates and allied compounds. A good show of the prussiates and cyanides will be found in a case containing products from the Mines de Bouxviller, especially a very fine crystallization of the red prussiate. But some gems of this class may also be seen in the collective exhibit of French pharmacists, in the amber crystals of lithium ferrocyanide, the dark garnet crystals of lithium ferricyanide, and the red-brown nitroprussiate of the same metal.

It would be tedious in the extreme to attempt to give a detailed description of the multitudinous pigments placed at the disposal of the dyer and printer. There are several capital displays of lakes and extracts. Marquet de Vasselot, of Paris, makes a very creditable display of cadmium yellows, ranging from orange red to lemon colour, and these are associated with metallic cobalt, smalt, cobalt pinks, the arsenate, borate, phosphate and silicate, as well as indigo sulphate, carmine of indigo (the purified colouring matter) and orcine. A. E. Dubosc, of Havre, shows a number of tinctorial and tanning extracts, including some quercitron extract of good appearance and quebracho extract in large resinous-looking masses. Of course it goes without saying that the so-called coal-tar colours are well represented, though, probably in consequence of the abstention of German manufacturers, the displays of these compounds are not so numerous in this as they have been in some less important exhibitions. One of the best of the exhibits is that of the Paris Aniline Colour Company, which is understood to be a development of the Paris Gas Company. Curiously enough about the most conspicuous feature of this case consists in some fine crystallizations, as well as packets, of antipyrine; but as these articles are distinctly labelled "antipyrin, Knorr," it is left somewhat in doubt whether the Parisian company is manufacturing the article under a licence to use the name of the inventor, or whether it is exhibiting an article of German manufacture. In the case of Durand, Huguenin and Co., of Gentilly, there is some fine indophenol resembling lumps of "washing blue" and dyeing like indigo. The exhibit of Guinon, Picard and Jary, of St.-Fons, may be said to combine the old and the new pigments, for it contains many of the tar colours, including fine masses of red and brown coralline, as well as indigo, orchil, and other vegetable derivatives. Lastly, a good collection of the products of the distillation of tar will be found in the exhibit of F. Dehaynin, of Paris, which includes anthracene and naphthaline, crude and purified, carbolic acid, pyridine and chinoline, and in that of Brigonnet and Naville, which includes aniline, toluene, and phenylamine and naphthaline compounds, essence of mirbane, chloride of benzyl, benzoic acid and benzaldehyd.

(*To be continued.*)

RECENT IMPROVEMENTS IN THE METHODS FOR THE MANUFACTURE OF CHLOROFORM.*

BY SAMUEL P. SADTLER, PH. D.

It is of course within the knowledge of the drug and chemical trade that along in the fall of 1885, a notable reduction in the price of chloroform took place, and that this reduction has been practically maintained since. Such a change indicates that either there has been a notable cheapening of the raw material of manufacture, a decided improvement in existing methods, or the introduction of an entirely new method for the manufacture of the staple so cheapened. In the case of chloroform it has been the latter.

The old process of manufacture by the action of bleaching powder upon alcohol has given way to what is now termed the "acetone" process. This is not, however, a new discovery. Liebig, in 1832, in following up his first account of the properties of the newly discovered "chloride of carbon" (chloroform), mentions that it can be gotten in very large quantities by the action of bleaching powder upon "pyroacetic spirit" (acetone), as well as from alcohol. That alcohol has all this time been preferred to acetone as a material from which to prepare chloroform, is due mainly to the fact that only in recent years has acetone been prepared pure in quantity, but also to the erroneous statement of Siemerling quoted in the works of reference like Watts' 'Dictionary of Chemistry,' that only 33 per cent. of chloroform could be gotten from acetone by the action of bleaching powder. Now that acetone is made on a large scale, and of extreme purity, and it has been shown that it is the richest chloroform-yielding substance known (206 per cent. by theory and 200 per cent. in practice at times), the case assumes a different aspect. Indeed, as was testified by one of the witnesses in the recent patent litigation on this subject (Michælis *vs.* Roessler), this process "is one of great importance to the manufacturers of chloroform, and of great value to the public for the reason that it enables the production of chloroform at a price which is nearly one-half its cost by any other method practised by manufacturing chemists or known by me."

The writer, having had opportunity to thoroughly study the new process in practice, desires to give an outline sketch of this recent revolution in the manufacture of so important a chemical as chloroform.

The manufacture of a purer grade of acetone than that then in use for solvent purposes having been begun in Germany in 1881 on the part of the "Verein

* From the *American Journal of Pharmacy*, July.

für Chemische Industrie," Liebig's old suggestion for the manufacture of chloroform from acetone was taken up by the "Verein Chemischer Fabriken," Mannheim, Germany, in the beginning of 1882, and a year later by the first-mentioned company, which made the acetone for both. In June, 1884, Mr. F. Roessler, of the present Roessler and Hasslacher Chemical Company, of New York, visited Germany and studied the process, which his company are now carrying out under the patents of Gustav Rumpf, to be described later. In the meantime Prof. G. Michælis, of Albany, obtained in July, 1885 (application filed Nov. 18, 1884) a patent for distilling crude acetate of lime (preferably, as the patent says, crude "brown acetate of lime") and using the liquid products of their distillation in connection with a hypochlorite for the manufacture of chloroform. Under this patent suit was brought against Roessler and Hasslacher for infringement. After protracted litigation, Judge Butler, of the United States Circuit Court, has just decided that in using pure acetate alone the defendants were using an old and well-known process and were not guilty of infringement. As both the production of pure acetone and the method of manufacture of chloroform are covered by patents issued in this country, the processes can be given in outline as there published.

The raw material with which the beginning is made is the "grey acetate of lime." While this is distinctly purer than "brown acetate" it still contains both moisture and tarry matter. To free it from these and to raise the percentage of actual acetate of lime, it is carefully roasted before being submitted to dry distillation. This roasting forms the subject of patent No. 393,079, issued to Gustav Rumpf, of Frankfort, Germany, and assigned to Roessler and Hasslacher, of New York. As shown in Fig. 1, it is done in a series

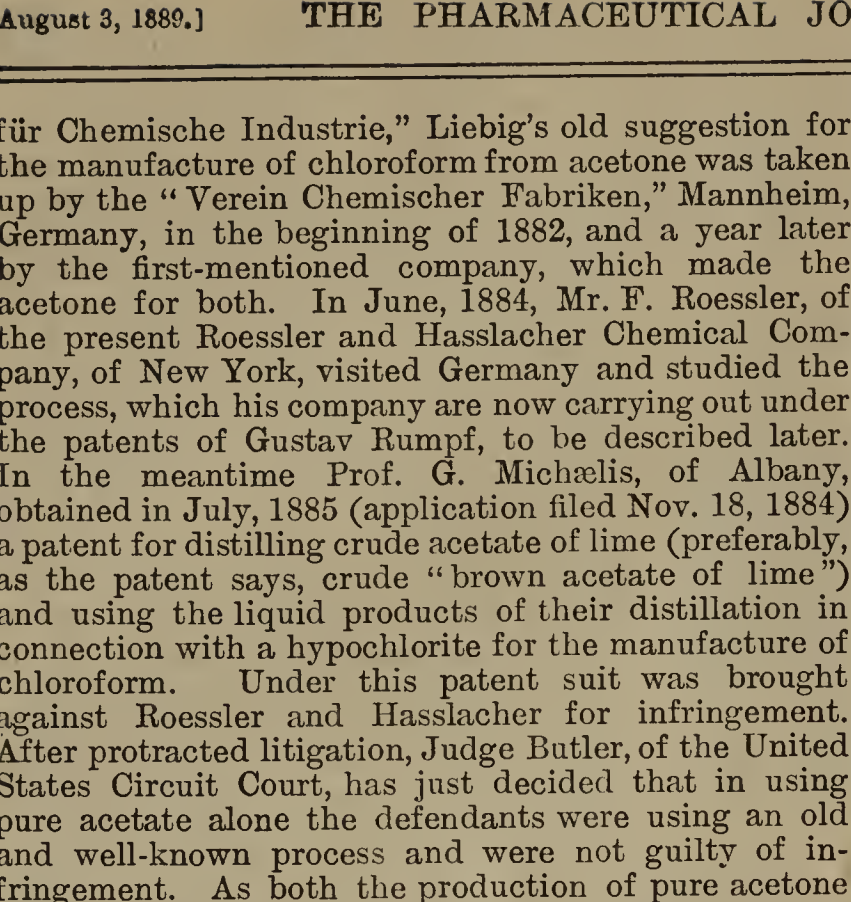

Fig. 1.

of three slightly-inclined cylindrical retorts, in which the material is continually pushed forward by revolving blades. The crude gray acetate is dropped in at *a* and passes along the length of the upper retort until it drops upon the blades which revolve in the second retort, and passing along this is dropped into the third or lowest retort, from which it issues at *g*, and is collected in suitable vessels. As seen in the illustration, the inclination of these three retorts is different, so that the material passes along most rapidly as it descends into the hottest retort below. At *e* and *f* are connections with the flue, through which the moisture and tarry vapours can pass off. By this continuous roasting process, the crude material can be purified without notable decomposition of the true acetate. The second patent, No. 385,777, issued to the same and assigned to the same, refers to the method of distilling the roasted gray acetate. Here, to secure the maximum yield of acetone, the points to be attained are uniformity of temperature throughout the whole mass and slow heating to not over 300° C. The patentee claims that "in the process of subjecting acetates in a closed vessel to heat applied externally to the vessel for distilling acetone from the acetates, the desired slowness and uniformity of temperature may be secured by stirring the acetates so that all portions of the mass will be subjected to the heat resulting from direct contact with the bottom of the vessel and by admitting free steam from time to time into direct contact with the acetates in case of any undesirable rise in temperature within the vessel."

Fig. 2 shows the form of retort in which this is effected. It will be seen mechanical agitation is provided for by the paddles which rotate around the vertical central axis. Steam is admitted by one of the openings above, while the products of distillation pass off by

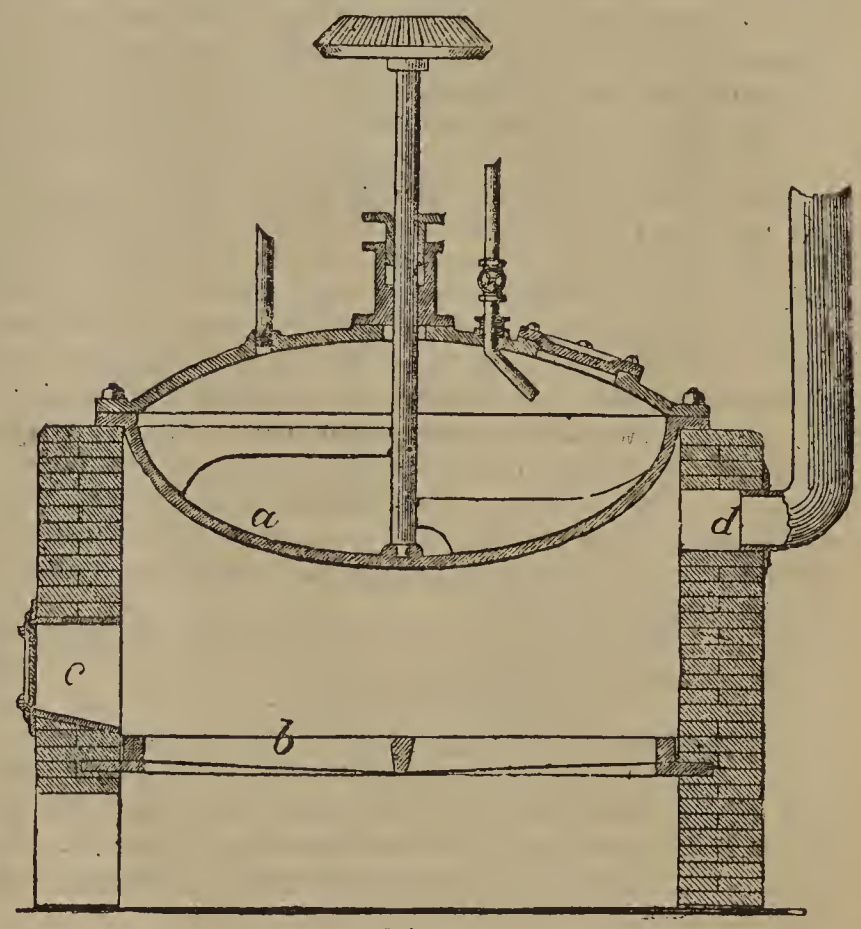

Fig. 2.

another opening in the top of the retort. The crude acetone distillate so obtained while richer than before in real acetone still contains oily distillation products and much water from condensed steam. In this dilute state it is treated with milk of lime to remove the higher ketones and other compounds. It is then distilled from a large plain still and the fractions rich in acetones passed to a column-still, where it is rectified until it becomes almost if not quite anhydrous. In practice, two column-still rectifications are carried out, one after the other, so that the pure acetone shows 99° or 100° by the alcoholometer. It is now fitted for use in the direct manufacture of chloroform. The process and form of apparatus for most successfully carrying out this chloroform manufacture constitute the subject of United States patent, No. 383,992, also issued to G. Rumpf, and assigned to Roessler and Hasslacher. The patentee first states that in order to get the full yield of chloroform it is necessary to take a much larger proportion of bleaching powder than that given in Watts's 'Dictionary of Chemistry,' vol. I., page 918, and states that for 58 pounds of acetone at least 600 pounds of chloride of lime of thirty-five per cent. available chlorine are necessary. The yield will then

be from 150 to 180 per cent. of the weight of the acetone employed instead of about 33 per cent.

The construction of the still and connections are shown in Fig. 3. The still having been filled to a

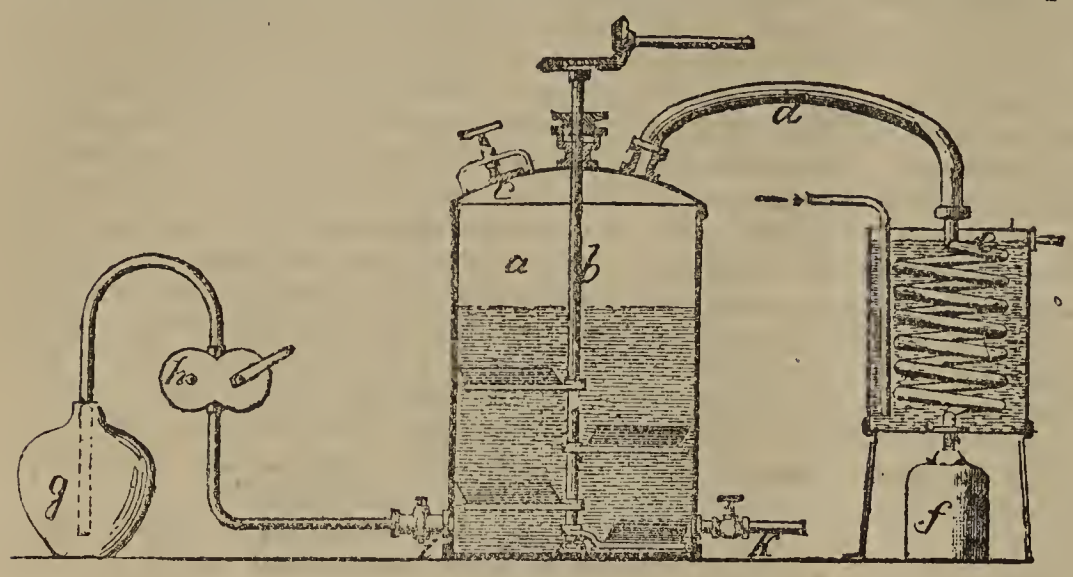

Fig. 3.

proper height with water, as shown in the cut, the charge of bleaching powder is introduced and the manhole *c* closed with cement. The agitators having been started by means of the revolving shaft *b*, the acetone, previously diluted, is pumped in gradually at *i*. As it enters, it rises and reacts with the bleaching powder solution, and the chloroform produced distils spontaneously from the delivery tube *d*, passes through the condenser *e* and is collected under water at *f*. The introduction of the diluted acetone is to be effected at intervals only, otherwise some acetone will distil over unchanged, or the reaction will become too violent and much frothing ensue. When the delivery of chloroform begins to slacken, steam is gradually introduced to heat up the mixture and drive over the last portions of the chloroform which remain. The contents of the still are then discharged through the outlet *k* into the drain. They consist of very dilute calcium acetate solution mixed with calcium hydrate and calcium chloride.

The reaction for this production of chloroform from acetone seems to be simply:

$$2C_3H_6O + 6CaOCl_2 =$$
$$3CCl_3H + Ca(C_2H_3O_2)_2 + 2Ca(OH)_2 + 3CaCl_2.$$

This would demand one equivalent of chloroform for one of acetone used, or 206 parts of chloroform by weight reckoned on the weight of the acetone. In practice 180 parts are usually obtained, although 200 parts have actually been obtained at times.

The chloroform obtained is quite free from the chlorinated side products which often accompany the chloroform made from alcohol. It is, nevertheless, thoroughly purified by treatment with sulphuric acid and careful washing, and it is then brought exactly to the United States Pharmacopœia standard.

NOTE UPON THE CANDYING OF FRUIT INDUSTRY AT LEGHORN.*

It would be a mistake to suppose that Leghorn is a great centre for this industry in all its branches. The candying of fruits, whole or cut, is carried on at many other places to a larger extent. At Genoa and westward along the French Riviera, at such places as Grasse, this industry is carried on, and we know that in Spain and Portugal fruits are also candied, Madeira being especially noted amongst the possessions of the latter for this manufacture. Moreover, upon inquiry I find that in this city of over 100,000 inhabitants only seven establishments are occupied in the manufacture, and that these seven, when in full working, only employ about 200 hands. Leghorn can hardly, therefore, be considered a great centre of the fruit-candying industry.

It does, however, I believe, occupy the first place in Italy, and perhaps throughout the Mediterranean for the preparation of the candied citron and orange peel so largely used in all branches of confectionery. For the citron is brought to us for this purpose from Corsica, from Sicily, from Calabria and other southern provinces of Italy, from Tunis and Tripoli, and even from Morocco; and the candied-peel of the fruit is exported hence to North America, to the United Kingdom, and to Hamburg, for distribution throughout Germany. Sugar also is imported for the purpose of the manufacture from Egypt. The wood of the boxes in which the candied peel is packed reaches us from Trieste, and the immense earthenware vessels necessary for the saturation of the fruit in sugar syrup are made in the neighbourhood of Florence.

On all sides I hear that Corsica produces the citron of the finest quality; those of Sicily and Calabria are regarded as slightly inferior; whilst that which comes from the African coast is held in still lower repute, and, indeed, appears to be of a different variety, being larger, and having a smooth instead of the rough granulated surface generally characteristic of the citron. The African citron is probably somewhat deficient in the essential oil which forms the medical property and gives the flavour to the rind. The oranges imported into Leghorn, whether for consumption or for candying, are nearly all brought from the islands of Sicily, Sardinia and Corsica.

I shall perhaps convey the clearest impression of the treatment of the fruit, and the processes through which it passes if I follow it through the various stages of its preparation, from its arrival at this port to the moment of its departure hence in cases filled with boxes neatly packed with the cut candied-peel.

In all the countries I have mentioned above as contributing the raw fruit for this industry it is treated in the same manner for the over-sea passage. The fruit is simply halved and placed in hogsheads or large casks filled with a fairly strong solution of brine, the fruit being halved merely to ensure thorough preservation of the rind by an equal saturation of the interior as well as the exterior surface. In these casks it arrives at the doors of the manufactory.

The first process to which it is then subjected is the separation of the fruit from the rind. This is done by women who, seated round a large vessel, take out the fruit, skilfully gouge out the inside with a few rapid motions of the forefinger and thumb, and, throwing this aside, place the rind unbroken in a vessel alongside them.

The rind is next carried to large casks filled with fresh cold water, in which it is immersed for between two and three days to rid it of the salt it has absorbed. When taken out of these casks, the rinds are boiled, with the double object of making them tender, and of completely driving out any trace of salt that may still be left in them. For this purpose they are boiled in a large copper cauldron, for a time varying from one to two hours, according to the quality of the fruit, and the number of days it has been immersed in brine. When removed from this cauldron, the peel should be quite free from any flavour of salt, and at the same time be sufficiently soft to absorb the sugar readily from the syrup, in which it is now ready to be immersed.

The next process to which the rind is subjected is that of a slow absorption of sugar, and this occupies no less than eight days. Needless to say that the absorption of sugar by fresh fruit in order to be thorough must

* From an official report by Mr. Consul O'Neill.

be slow, and not only slow, but must also be gradual. That is to say, the fruit should be at first treated with a weak solution of sugar, which may then be gradually strengthened, for the power of absorption is one that grows by feeding. The fruit (and this holds good more especially with the rind) would absorb with difficulty, and more slowly and unequally, if plunged at once into a thick syrup, than if gradually treated with weak solutions easier of absorption, and by which it has been thoroughly permeated first. It is a knowledge of this fact that governs the process I now describe.

The fruit has now passed into what I may call the saturating room, where on every side are to be seen long rows of immense earthenware vessels, about 4 ft. high and 2½ ft. in extreme diameter, in outline roughly resembling the famed Etruscan jar, but with a girth altogether out of proportion to their height, and with very short necks and large open mouths. All the vessels are filled to their brims with citron and orange peel in every stage of absorption, *i.e.*, steeped in sugar syrup of, roughly speaking, eight different degrees of strength. I said before that this is a process that occupies almost always eight days, and as the syrup in each jar is changed every day, we may divide the mass of vessels before us into groups of eight. Take one group of this number, and we are able to follow the fruit completely through this stage of its treatment. With vessels of such great size and weight, holding at least half a ton of fruit and syrup, it is clearly easier to deal with the syrup than with the fruit. To take the fruit out of one solution and to place it into the next stronger, and so on throughout the series, would be a toilsome process, and one moreover injurious to the fruit. In each of these jars, therefore, is fixed a wooden well into which a simple hand suction pump being introduced, the syrup is pumped from each jar daily into the adjoining one.

"How is the relative strength of the syrup in each jar regulated?" is the next question. "The fruit itself does that," is the foreman's reply; and this becomes clear from the following explanation. Number your group of jars from one to eight respectively, and assume No. 1 to be that which has just been filled with peel brought straight from the boiler in which it has been ridded of the last trace of salt, and No. 8 to contain that which, having passed through every stage of absorption but the last, is now steeped in the freshly prepared and therefore the strongest solution of syrup used in this stage.

"We prepare daily a syrup of the strength of 30 degrees, measured by the 'provino,'"* continued the foreman; "and that is poured upon the fruit in jar No. 8. To-morrow the syrup from this jar, weakened by the absorption from it, by the fruit, of a certain proportion of sugar, will be pumped into jar No. 7, and so on daily through the series. Thus, No. 1 containing the fruit will be treated with the weakest solution of syrup, and the fruit itself regulates the strength of the syrup as I said." "But if the syrup has lost all its strength before the seventh day, or arrival at jar No. 1?" we ask. "Care must be taken to prevent that, by constant testing with the 'provino,'" is the reply; "and if that is found to be the case, a little stronger syrup must be added to the jar."

A slight fermentation next takes place in most of the jars, but this, so far from being harmful, is regarded as necessary, but of course must not be allowed to go too far.

There is yet another stage, and that, perhaps, the most important, through which the peel has to pass before it can be pronounced sufficiently saturated with sugar. It is now boiled in a still stronger syrup of a density of 40 degrees by the testing-tube, and this is done in large copper vessels over a slow coke fire, care being taken to prevent the peel adhering to the side of the vessel by gentle stirring with a long paddle-shaped ladle. This second boiling will occupy about an hour.

Taken off the fire, the vessels are carried to a large wooden trough, over which is spread a coarse, open wire netting. The contents are poured over this, and the peel distributed over the surface of the netting, so that the syrup—now thickened to the consistency of treacle—may drain off the surface of the peel into the trough below. The peel has now taken up as much sugar as is necessary.

Now comes the final process, the true candying, or the covering of the surface of the peel with the layer of sugar crystals which is seen upon all candied fruits. To effect this a quantity of crystallised sugar—at Leghorn the same quality of sugar is used as employed in the preparation of the syrup—is just dissolved in a little water, and in this the now dried peel taken off the wire netting is immersed. The same copper vessels are used, and the mixture is again boiled over a slow fire. A short boiling will suffice for this, the last process, for the little water will quickly be driven off, and the sugar upon cooling will form its natural crystals over the surface of the fruit. Poured off from these vessels it is again dried upon the surface of the wire netting, as before described. The candying is now complete, and the candied-peel is ready for the packing-room, to which it is carried off in shallow baskets.

In the packing-room may be seen hundreds of boxes of oval shape, or, if I may so speak, of rectangular shape, with rounded corners and of different sizes, for each country prefers its own boxes to be of a particular weight, Hamburg taking the largest, of 15 and 30 kilos., the United States of America preferring smaller of 10 and 12 kilos., whilst England takes the smallest of 5 kilos., and one containing about 7 English pounds. The wood of which the tops and bottoms of these boxes are made comes to us in thin planks from Trieste, and a skilful workman, paid 3 francs a day, will complete 70 boxes per diem. The packing is generally done by women, and the boxes are lined with white paper. They are then packed in cases of 100 kilos., 10 of the smaller American boxes filling a case. The candied-peel is now ready for export.

I think I have now spoken of all that need be noticed in the actual manufacture of candied, citron and orange peel at Leghorn. There are, however, a few reflections upon the very existence of this industry here which seem to me suggestive and instructive ones. In my inquiries into the course of the industry I find that the fruit itself, and every ingredient and article necessary to the preparation of the candied-peel comes to us from abroad. The fruit of the best quality is from Corsica; Egypt furnishes the sugar; England provides the fuel, distant provinces of Italy contribute a portion of the raw product and the wood for the boxes in which the peel is exported. The province of Leghorn provides nothing but the labour necessary to the manufacture. Nor is this industry one that has fallen into Livornese hands from any specially acquired local handicraft or skill. How then does this industry exist here in these days of keen international competition? No doubt it is mainly supported by the large drawback granted by the Italian Government upon the duty paid on the chief and dearest ingredient in the manufacture—sugar. The Customs tariff in force imposes a duty of 76·75 lire upon 100 kilos. of the sugar used (classed in the tariff as of second class), but grants a drawback of 60·50 lire upon 100 kilos. of the exported article. Without this large measure of support there can be no doubt this industry would

* A graduated test for measuring the density of the syrup.

immediately and wholly collapse. With it even it finds it difficult to hold its ground. Exporters tell me that the United Kingdom is beginning to call for the fruit to be sent to it direct from the countries of production in the same condition that it reaches Leghorn, viz., steeped in brine, and the manager of one of the factories I visited confirmed this with an air of very natural chagrin by telling me that he had himself seen 600 hogsheads of fruit shipped in brine in one vessel last year from Bastia for England.

THE CHEMISTRY OF SALIVA.*

BY DR. G. STICKER.

The author has published in the *Deutschen Medizinal-Zeitung* a long and highly interesting communication upon saliva and the portions more important to pharmacy are here reproduced in a condensed form.

Human saliva is colourless or presents a somewhat bluish tinge and has a sweetish or saline taste. The specific gravity varies between 1·002 and 1·008, but under a purely vegetable diet this is lowered. In the evening and after the different meals the saliva is heavier than in the morning or when fasting; in the former case too it presents an alkaline reaction, but in the latter it reacts faintly acid. With an increased consumption of amylaceous food the alkali in the saliva increases, but with a pure flesh diet it decreases. Whilst in the horse the quantity of saliva secreted in twenty-four hours will amount to four to six kilograms, it amounts in grown men to from 500 to 1500 grams. In the flesh-eating dog the quantity is still much smaller, since flesh-eaters require less saliva for their food, which is rich in water; the most being required by granivorous animals for their relatively dry food.

In respect to diastatic power the saliva of omnivorous man exceeds that of any other creature. In the first two months of an infant's life the diastatic power of the saliva is almost without exception wanting. Occasionally it is present in the saliva of the three months' child, but the more intense action does not become manifest until towards the end of the first year. The toothless child should therefore obtain only liquid nourishment and have flesh given to it only after the appearance of the incisors and canine teeth. The body temperature of 38° to 39° C. is the most favourable for the saccharifying action of human saliva.

Ptyalin is paralysed by alcohol and the diastatic action of the saliva is also stopped by large quantities of alkalies or acids. One per cent. solution of carbolic acid in contact with saliva deprives it after a time of the power to decompose starch. A 0·2 per cent. solution of salicylic acid diminishes the salivary fermentation, and a 1 per cent solution stops it entirely. But it is remarkable that this action is not exercised by the sodium salt of salicylic acid, notwithstanding that it possesses antizymotic properties. A similar action, but to a greater extent, is however shown by salicylic acid upon emulsin, myrosin, and synaptase, whilst pepsin and trypsin can be protected from putrefaction by the addition of salicylic acid without their specific action being injured in the least. Borax does not kill diastase, whilst quinine and arsenious acid paralyse the ferment only in very large doses. Quinine, strychnine, morphine and curare in small quantities promote the fermentative action of the salivary liquid, in accordance with the known pharmacological axiom that small doses frequently excite while large doses paralyse. A similar behaviour is shown by the pancreas-ptyalin. Sodium chloride solution up to a strength of 3·85 per cent. promotes the fermentative action of saliva, a higher percentage diminishes it. The same action is shown by sodium sulphate and ammonium chloride, whilst the fermentative action is depressed by ammonium nitrate and potassium chloride. At a temperature of 38° to 40° C. salicin is converted by the salivary ferment into sugar and salicin, but it is not so split up by diastase. Tannin, also, is decomposed into gallic acid and sugar by the diastatic ferment of the saliva, and animal glycogen is converted by it into γ-dextrin and ptyalase.

In respect to the secretion of saliva it has been found that a temporary diminution of human saliva may be effected artificially by paralysing the nerves of secretion by means of atropine, daturine, cicutine, iodethylstrychnine and nicotine in large doses. The agents having a reflex action upon the salivary function, as, for instance, calamus root, absinth, ginger and black and cayenne peppers, stimulate the secretion, but where these fail, use is made of digitalin, nicotine, aconitine, physostigmine or pilocarpine. Potassium iodide has also proved effective in stimulating the secretion. Psychic moments, such as the perception of savoury food, or lascivious thoughts, will induce in healthy men an increased flow of saliva. A salivary flow is also caused by iodine salts, iodine and allied halogens, gold chloride and nitrate, and copper and lead salts; also by some alkaloids, as nicotine, physostigmine, and pilocarpine, muscarine, as well as by digitalin, sphacelinic acid and cornutin. It has also been observed in cases of carbolic acid poisoning.

Should the salivary glands become affected in consequence of fever, the saliva will occasionally contain as much as 5 per cent. of albumen, and also in cases of iodism and mercurialism. When there is blood decomposition, as, for instance, the dissolving of the blood corpuscles by arseniuretted hydrogen, frequently the saliva will be sanguineous. In cases of suppression of urine the occurrence of urea in the saliva has been observed. In uraemia ammonium carbonate has been ascertained to be a constituent, and in mercurial salivation valerianic acid appears in small quantities.

The passage of arsenical medicines into the saliva is frequently observed, while iodine and bromine especially find their way into it very rapidly. The interval between the taking of 0·2 gram of potassium iodide fasting and the first detection of an iodine reaction in the saliva varies between nine and twenty-two minutes, and in the urine between nine and nineteen minutes. The metals combined with the halogens iodine and bromine, such as potassium, sodium or lithium, cannot be detected simultaneously in the saliva. Mercury passes into the saliva only when the system is completely saturated with that metal. Saliva containing iodine or bromine converts starch equally rapidly into dextrin and maltose as when normal; also calomel saliva is not injured as to its saccharifying power. Copaiba balsam can be recognized in the saliva of persons who take it almost immediately. According to the investigations of L'Héritier the saliva of a healthy person contains 98·65 per cent. of water, 1·26 per cent. of organic matter and 0·09 per cent. of salts.

From antiquity a high therapeutic and toxic action has been ascribed to saliva, and emperors and kings have worked "miracles" by means of their spittle. Recently Brera has mixed saliva, on account of its easy absorption with ointments and other external applications. He reports that in chlorosis he has obtained good results by the admixture of saliva with opium, and he also speaks favourably of mixture of saliva with scilla, digitalis, aconite and sublimate. Dr. Sticker further seems to have stated in his paper that it is the custom of the German *apotheker*, when preparing mercurial ointment, to spit into the mortar, but this is distinctly contested by the editor of the periodical from which the foregoing abstract is taken.

* From the *Apotheker-Zeitung*, March 27.

The Pharmaceutical Journal.

SATURDAY, AUGUST 3, 1889.

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NEWCASTLE.

THE purpose of the present article is to give a few notes which may interest those of our readers who are looking forward to the approaching meetings of the British Pharmaceutical Conference and the British Association. It is not the intention to adhere to the orthodox fashion of giving first the history, and then describing the place as it now is. The more natural line is to take what will be seen by the visitor in 1889, and point out its present importance as well as its historical associations.

CAMDEN describes Newcastle as "The eye of the north; the hearth that warmeth the south with fire, an Egypt to all the shires of the north in time of famine for bread." That "*providential arrangement*" by which large rivers flow past populous centres finds expression here. The noble estuary of the Tyne has in all English history formed an important highway, and it is now the centre of a vast trade which for variety and economic importance has hardly a rival.

It is often interesting to speculate on the causes which have led to the precise location of towns and trade centres, and in the case of Newcastle and the Tyne it is easy to see the reasons which made the river invaluable in semi-barbaric times as well as those which have operated in making it a centre of trade in times more civilized.

The nucleus round which the original town was formed was one of a very definite character, and was marked by the intersection of the Roman Wall and Hadrian's Bridge over the Tyne. Just three miles farther east was the eastern terminus (Wallsend) of that remarkable wall which secured to the great Roman general and emperor his possessions in England, from the marauding tribes of Picts in the northern portion of our island, and here at a point of singular geographical fitness the same genius caused the bridge to be built, which bore the name of his illustrious family (the Ælian), being known as Pons Ælii. A narrow stretch of low shore on each side of the river, gave the requisite space for abuttments and approaches, while adjacent high ground, also on both sides of the river, gave the needful points from which defensive operations could be carried out. The waterway and harbour were thus protected, and the road for mercantile and aggressive operations on the north side of the Tyne rendered secure. A mere passing glance at the spot will suffice to show why the great constructor chose the line of his wall and the site of his bridge. Near to the town, though not actually within its limits, that wall may still be seen in short spaces, and excavations within the present century have shown not only the wall but the fort or station which protected this point. And on the site of that bridge stands the swing bridge of to-day, whose perfect mechanism for turning to allow the passage of vessels is a specimen of the hydraulic work of Mr. W. G. ARMSTRONG, at first a solicitor in the town, and now Lord ARMSTRONG of world-wide fame as a scientist and a constructor. Looking down upon that bridge is the great work of ROBERT STEPHENSON, the High Level Bridge, the lower roadway of which is far enough above the water level to permit the passage of the largest vessels, while the railway line, which will convey the visitor from the south into Newcastle, is carried above that roadway, so that on entering the town the eye glances at once upon the relics of a past full of historic interest and signs of a present full of busy life.

Fronting on the right, is the castle from which the town takes its name, although the prefix "New" has ceased to be true in the absolute sense.

A stern-looking fortress, which seems as if it must have meant business in the fighting line. One feels that its builders must have tried to produce something as nearly as possible like a fort of solid rock. It was built by WILLIAM RUFUS to render the Norman conquerors safe from the inconvenience which beset his great father on his expedition against the Scots. HARDYNG (16th century) says of the younger WILLIAM :—

> "He buylded the New Castell upon Tyne,
> The Scottes to gainstand and to defend,
> And dwel therin; the people to incline
> The towne to buyld and wall as did append,
> He gave them ground and gold ful greate to spend,
> To buyld it well and wall it all about,
> And fraunchised them to pay a free rent out."

That black grimy building of Norman type was the keep of the castle, which, within its outer ramparts, enclosed about three acres. Its principal entrance, the Black Gate, still stands, though its pointed arch indicates reconstruction at a later date. The buildings attached to this gate and the castle itself are now used as museums, and there are shown many antiquities over which hours of interesting study might be spent; the internal structure of the castle itself will, however, probably interest visitors most. A long flight of stone steps

flanked by the quaintest of old shops leads from the level of the castle to the quayside below. In the above metrical chronicle of the doings of the Red King it is recorded that to him the old town owed its wall, and this was altered as the town grew. Early in the fourteenth century the wall was 2 miles long, 8 feet thick, and 12 feet high. Each of its numerous angles bore a tower, and entrance was obtained to the town by six gates, while the south front of the town was open to the Tyne.

A few yards north of the Black Gate our attention is claimed by the Church of St. Nicholas, as being the mother church of the town, and now the cathedral of the diocese of Newcastle. Built circa 1350, its most beautiful external feature, the steeple, was added probably one hundred years later. Novocastrians are justly proud of this beautiful spire. Its tower is square, and from its top corners spring flying buttresses with graceful curve, and upon their junction is placed an elegant lantern surmounted by a spire. The spring of the buttresses is screened by small octagonal turrets. St. Giles, Edinburgh, is an imitation of this, and even Sir Christopher Wren condescended to copy it for St. Dunstan's, London. The bestowment of cathedral honours upon this church has been handsomely appreciated by the enrichment of its interior. A fine reredos of stone has been erected, while the enclosure of the choir and canons' stalls has called forth the highest talent in wood carving of our day.

Newcastle has not contentedly rested upon its historical greatness, for, by the genius of Richard Grainger, the centre of the town has, during the earlier half of the present century, been completely remodelled; and its business streets will yield to no city in the kingdom in an architecture at once striking and substantial. The form is that of a triangle, consisting of Grainger Street, Grey Street, and the line of Collingwood Street and Mosley Street. These streets are flanked on two sides by Pilgrim Street and Clayton Street, and intersected by shorter streets. The graceful sweep of Grey Street enhances the work of the builder, and presents one of the most pleasing city thoroughfares of our land. A deep ravine in the line of this street was a formidable obstacle to the architect, and this was got over by arching, the whole of the lower end of the street being carried upon unseen arches.

The commercial exchange and shipping industry of the Tyne are managed on the Quayside, approached mainly by a street of steep gradient. Even here the hand of time has dealt gently with history's landmarks, and the castle stairs, the Dog Leap Stairs and Akenside Hill will delight the curious, while those disposed to the romantic will look with interest to the house on the sandhill, from whose window (still marked) Lord Eldon, Chancellor of England, in the days of his youthful ardour as plain Jack Scott, stole away the fair daughter of Surtees the banker. Judging by the size of her point of egress, the slender damsel must have possessed a form which would fill with envy the fair habitués of Rotten Row and Bond Street.

In "The Side" much of quaintness may be seen in the old houses, in one of which Lord Collingwood was born, and in the churchyard behind stands the workshop of the famous Thomas Bewick. At the eastern end of the quayside lovers of song will find the Sandgate, celebrated in the famous Tyneside song, "Weel may the keel row." North and west of this portions of the old town wall appear, and although it becomes lost in the centre of the town, it may be found again near to St. Andrew's Church, where large and interesting portions of the "West Walls," with remains of its tower, will merit attention. The Friars in Charlotte Square and some old houses in Low Friar Street are also worth seeing.

The suburbs of the city are by no means unworthy of its business importance. On all sides, except the river, the town is surrounded by high ground; the portion near the river is devoted to very varied manufactures, and north of this busy and crowded strip are to be found terraces of houses well laid out, and lacking only in trees to make them boulevards of considerable beauty. It is to be hoped that the Newcastle Tree Culture Society will work this most necessary reform. Seven parks nicely placed and well kept afford breathing space and recreation ground for the citizens. Elswick Park, the most westerly of the parks, contains in its hall the models of the great sculptor John Lough, a collection of considerable value. The Leazes Park is large and well laid out; rendered gay by the important autumn flower show of the northern counties, it will, in conference week, be specially attractive. It is placed upon a corner of the town moor, one of the grandest boons ever vouchsafed to a manufacturing town; its ample expanse of green, nearly two square miles in extent, forms the playground of the toilers in the great factories and the showground of the north of England. Here the Jubilee Exhibition of 1887 was held on a site now laid out as the latest addition to the parks. But it is to Jesmond Dene the palm must be yielded, not from Newcastle alone, but from the whole kingdom, as being one of the most lovely public parks in her Majesty's dominions. Originally a pretty glen of three-quarters of a mile in length, it was afterwards owned and beautified by Lord Armstrong as a private park, and a few years ago was presented as a gift to the town, the gift being accepted on behalf of the burgesses by the Prince of Wales. The genius by which nature has been helped to be picturesque without being improved out of existence, calls forth warm admiration; and

as one sits in the leafy shade listening to the sound of the waterfall, it is hard to imagine that we are scarcely outside the busy town of a hundred manufactures. Here, too, the historical breaks in again, for the ancient Pilgrim Street and Gate was the avenue for the trooping pilgrims to the well and chapel of St. Mary, which may yet be seen, the latter being still perfect in outline though small in extent. From the mound on which it stands, the "Jesus Mound," Jes-mond takes its name. A light and elegant iron bridge spans at considerable height the valley (Dene) below and forms the way to the Armstrong or Heaton Park, and so is completed the line of parks which almost encircles the town.

Before turning to the manufactures of the Tyne, a glance at the centres of learning in Newcastle is requisite. The University of Durham has with that spirited enterprise which has characterized it during the past half century extended its field so as to make the northern metropolis a most important seat of its teaching work. In Newcastle the University has its College of Medicine, and its College of Physical Science. The New College of Medicine in Bath Road, just approaching completion, is in every way worthy of the important position which this school has now reached, and its professorial staff, drawn from local practitioners of medicine, is one well qualified to do tutorial work of a high order. In its older premises, now demolished to make way for railway extensions at the Central Station, were delivered the lectures on Pharmacy of Mr. B. S. Proctor, F.I.C., which have now so largely become the text-book of English pharmacy. The College of Science, a new and handsome structure in College Street, Barras Bridge, possesses a special interest for our readers as the place where the Conference meetings of 1889 are to be held, and the fine suite of rooms so generously placed at the disposal of the pharmacists will be appreciated by all who attend. Interest will also be found in the fact that the classes of the North of England Pharmaceutical Association form an integral part of the College work. Dr. G. S. Brady, the able Professor of Biology at this College, is the brother of the distinguished pharmacist and former President of the Conference, Mr. H. B. Brady, F.R.S. In this College, by a liberal expansion of the Universities Extension Scheme, the degrees of B.Sc., etc., etc., can now be taken out by attending either day or evening classes.

The Institute of Mining Engineers finds its home in the Wood Memorial Hall, near the Central Station. Adjoining this are the fine library and rooms of the Literary and Philosophical Society, whose Committee has kindly placed the rooms at the disposal of members attending the Conference.

AWARD OF THE HANBURY MEDAL TO PROFESSOR PLANCHON, OF PARIS.

The roll of recipients of this distinction recognizing high excellence in the prosecution or promotion of research in connection with the Natural History and Chemistry of Drugs is at present necessarily but small, as it is only eight years since the biennial award was inaugurated. Members of the Society and those who take an interest in the studies to which the medal relates will, however, be gratified to find that by the decision recently arrived at by the adjudicators, the class of Hanbury medallists, notwithstanding its small number, will have acquired still more of the international character which it may be expected to present in the future. The choice has, in this instance, fallen upon a Frenchman, Professor Gustave Planchon, M.D., D. es Sc., Director of, and Professor of Materia Medica in, the École Supérieure de Pharmacie de Paris, and an honorary member of the Pharmaceutical Society. The name of Professor Planchon will be familiar to the readers of this Journal, not only by reason of the official position he occupies in connection with the Paris School of Pharmacy, but also as the author of numerous papers which have appeared in our pages, and have constituted valuable contributions to our knowledge of drugs. It may also be added that Professor Planchon is the editor of the 6th and 7th editions of Guibourt's 'Histoire naturelle des drogues simples ; the author of a manual of Materia Medica entitled, "Traité pratique de la determination des drogues simples d'origine végétale." The Essay on "Des Quiquinas," by Professor Planchon, was translated into English by direction of the India Office, and among the numerous other articles contributed to French journals, a list of which will be found in the Royal Society Catalogue of scientific papers, may be specially mentioned 'Études sur les Strychnos.'

We understand that the inaugural address at the opening of the School of Pharmacy next October is to be delivered by Mr. John Marshall, F.R.C.S., F.R.S., President of the General Medical Council. For some years past the Society has been very fortunate in obtaining for this function the services of men of eminence in science and medicine, and our readers will be glad to see that on the present occasion the same advantageous condition will be maintained. This will be the second time that the delivery of the inaugural address of the session has been undertaken by a President of the General Medical Council, and the fact affords special reason for congratulation, not only as being in itself proof of the increased esteem in which the Pharmaceutical Society is now held, but also as furnishing one of the best grounds for hoping that the establishment of better and more intimate relations with the medical profession may pave the way to a realization of the objects of the Society, and a general advancement of the interests of pharmacy.

Proceedings of Societies in London.

ROYAL COLLEGE OF PHYSICIANS.

[CROONIAN LECTURE.]

RELATION BETWEEN CHEMICAL STRUCTURE AND PHYSIOLOGICAL ACTION.

BY T. LAUDER BRUNTON, M.D., F.R.S.

(*Continued from page* 77.)

ANALGESICS.

Non-reception and Non-perception of Painful Stimuli.—The two classes of drugs which we have already considered, general anæsthetics and local anæsthetics, both abolish pain: the latter by acting upon the peripheral terminations of sensory nerves, so that they do not receive the painful stimuli; and the former upon the nerve centres, so that they do not perceive them.

Non-transmission of Painful Stimuli.—But pain will also be relieved if the conducting power of the sensory nerve trunks or of the sensory paths in the spinal cord be so altered that painful impressions can be no longer transmitted.

Action of Cocaine on Nerve Trunks.—Cocaine has this effect upon nerve trunks when locally applied, for, when injected subcutaneously near a nerve, it may produce anæsthesia in all the district to which that nerve is distributed.*

Action of Cocaine on the Spinal Cord.—It has a similar action on the sensory tracts of the spinal cord, for Hughes Bennett† found that it rendered these tracts insusceptible to stimulation; and Mosso‡ found that both conductivity and reflex excitability in the cord are destroyed by it before the nerve trunks, either sensory or motor, are paralysed.

Action of Cocaine on the Cerebral Cortex.—It lessens the irritability of the cerebral cortex when directly applied, for if a 4 per cent. solution be applied to the motor areas, no convulsions can be produced by irritation by a faradic current.§

Excitability and Conductivity.—We must distinguish between excitability and conductivity both in nerve trunks and in the spinal cord. For these two functions of nerve fibres are to a certain extent independent of each other, and a nerve fibre may still be able to conduct stimuli from the peripheral terminations to the nerve centres, and *vice versâ*, when irritation applied to the nerve trunk produces no apparent effect. This condition may occur after exposure to great cold, and also in some pathological conditions.

Action of Drugs on the Conducting Power of Nerve Fibres.—Loss of conductivity may also be produced by the application of various substances to the nerve trunks, and a knowledge of the effect of drugs on the conducting power of nerve fibres appears to me absolutely necessary in order to understand the action of drugs on the spinal cord or on the higher nerve centres. For in the cord and brain the nerve cells and nerve fibres are so closely associated, that it is very difficult, if not impossible, to separate the action of a drug on the one from its action on the other. But in the nerve trunks we can apply the drug to nerve fibres alone. Having thus ascertained its action upon them, we may be able to judge with greater certainty what part of the drug's effect on the spinal cord is due to its action on the fibres, and what to its action on the cells.

For this reason I thought it necessary to begin a research on this subject along with my assistants, Dr. Batten and Mr. Bokenham.

The method employed was to take the sciatic nerve of a frog, with the gastrocnemius muscle attached, so that its contraction or non-contraction when the nerve was stimulated might serve as an index for the presence or absence of functional activity in the nerve.

The nerve could be stimulated by a faradic current, either at the end farthest from the muscle, or at a point nearer the muscle. A large portion of the nerve was placed in a small glass chamber, into which various vapours or liquids could be introduced at will, so as to act on the nerve trunk. When the nerve was in its normal condition, the muscle contracted on stimulation of the nerve either at a spot within the glass chamber (*a*) or outside it at the further end (*b*). But if carbonic acid was introduced into the chamber, it abolished the irritability of that part of the nerve on which it acted, so that stimulation at B no longer caused any contraction of the muscle. But it did not destroy the conductivity nearly so quickly, for a stimulus applied at A would be conducted to the muscle, and cause contraction, when one applied at B had ceased to have any effect. Alcohol and ether had just the opposite effect, for they destroyed conductivity before irritability so that stimulation at A had no effect, while it caused contraction if applied at B. Phenol acted like carbonic acid, and destroyed irritability before conductivity. The action of dimethylbenzene differed according to the position of the methyl groups. Orthodimethyl, benzene, or orthoxylene had almost no action; paraxylene increased the irritability of the nerve, so that a single stimulation caused tetanus, and metaxylene did the same to a still greater extent. The number of substances experimented with has been considerable, but it would occupy too much time to discuss the results now. I would merely draw attention to the action of xylenes as having a possible bearing on the action of analgesics.

Mode of Action of Analgesics.—But our knowledge of the conduction of impressions in nerve trunks and the spinal cord is insufficient as yet to explain either the physiology of pain or the action of analgesics. We frequently notice that a very small dose of laudanum, such as 3 or 5 minims, will relieve abdominal pain without producing the least drowsiness, or, indeed, without exerting any other apparent effect upon the organism; and a similar result may be observed in severe headache from the administration of 5 or 10 grains of antipyrin. In trying to explain such phenomena we are obliged to have recourse to hypotheses. A hypothesis in itself has no value, and is worse than useless if it leads people away from facts, but it is extremely useful when limited to its proper function, namely, to help us to string together facts which are already known, and to indicate the direction in which to look for new ones. Thus Dalton's atomic theory has been of the utmost value to chemistry, and the hypothesis that the carbon atoms are united into a ring has not only rendered the classification of aromatic compounds much easier, but it has aided in the discovery of new ones.

Facts regarding the Transmission of Painful Impressions.—As the first function of the hypothesis is to link facts together, let us first see what facts we have got in relation to pain. Painful impressions are conveyed by the grey substance in the spinal cord. This seems to be shown both by physiological experiments and by clinical observations. Tactile impressions are conveyed by the white matter, probably in the lateral columns. Tactile impressions are conducted more quickly to the brain than painful ones, and a more powerful stimulus is required to produce a painful impression than a tactile one.

Fibres and Cells as Conductors.—This is exactly what one would expect from the different nature of the conducting paths of the two instances; for the nerve fibres which conduct the tactile impression have

* Hall and Halsted, *New York Med. Journ.*, Dec. 6, 1884.

† Hughes Bennett, *Edin. Med. Journ.*, Oct., 1873.

‡ Ugolino Mosso, *Arch. f. exp. Path. u. Pharm.*, vol. xxiii., p. 153.

§ Tumass, *Arch. f. exp. Path. u. Pharm.*, vol. xxii., p. 107.

an almost direct course, and afford little opportunity for any weakening of the stimulus by diffusion. The branching cells of the grey substance, on the contrary, form a zigzag path which must be longer than the other; it probably presents greater resistance, and it affords more opportunity for entire loss of the stimulus by diffusion to other cells in the cord. Thus, unless stimulus is tolerably powerful, none of it may pass upwards to the brain, and therefore no painful sensation will be perceived.

Summation in Cells.—But, on the other hand, it would appear that the cells of the grey substance in the spinal cord or the sensory ganglia of the brain may be so excited by a succession of very feeble stimuli, each reinforcing the other, that the extremest agony may be produced. Thus we have all heard that one of the most dreadful tortures of the Spanish Inquisition consisted in allowing a single drop of water to fall at regular intervals; and Naunyn* has found that in some cases of spinal disease intense pain may be caused by gently touching the foot with the point of a camel's-hair pencil at regular intervals. A summation of the stimuli appears to go on in the cells, each stimulus increasing the effect of the preceding, just as a slight touch upon a swing, repeated at the proper moment, will send it higher and higher and higher until it oscillates to the fullest extent of which it is capable.

Effect of Stimuli depends on Time of Application.—But if similar touches be applied to the swing so as to interfere instead of to assist its oscillation, they will soon bring it to rest. Similar touches will thus produce opposite effects from a change in their relations to the oscillation of the swing. Translating this into physiological language, we should say that in the first instance we had a case of summation, in the latter of inhibition. Let us follow this familiar illustration one step further. We all know that when we start a swing we stand close to it at the spot where it hangs when it rests, and as its oscillations get longer and longer we move farther back. If we move a little way back our pushes will first have the effect of summation, but if we remain in that position and do not adapt our pushes to the increasing oscillation of the swing, they will lessen instead of increase its movements, or, in other words, they will have an inhibitory action. Thus we will have stimuli producing alternately an increase and a diminution in the oscillations in the swing, though the increase and diminution will not be very great.

Alternate Stimulation and Inhibition in Health.—We seem to have a somewhat similar condition in the nervous system. Some time ago I was making some experiments with one of Mr. Francis Galton's whistles, which he kindly lent me. I adjusted it so that the sound produced was almost at the upper limit of my sense of hearing. On then sounding it continuously I was struck by the fact that the sound was alternately audible and inaudible, although I ascertained that no corresponding change occurred in the strength with which the whistle was blown.

In Disease.—A similar observation was made by the younger Remak† in relation to pain in the case of tabes dorsalis. He found that when a faradic current was applied by a brush the sensation it produced gradually increased, then diminished and increased again, although the strength of the current remained perfectly the same. With a weak current, the increase each time became less, and the pauses between became greater, until at last no sensation was felt. With a stronger current the sensation gradually increased until it became so painful as to be unendurable.

Possible Effect of the Blood.—In my own case I was unable to satisfy myself that the alternate appearance and disappearance of the sound of Galton's whistle might not be due to an alternate increase in the sensibility of my auditory centres from altered supply of blood, for I observed* some years ago a capillary pulsation in man which usually occurs about once in twenty seconds, and this appeared to be nearly the time of each wave of hearing. In Remak's case the waves of sensation were from twenty to fifty seconds, and the alteration in the length of interval between them renders it probable that they were due to summation in the nervous system itself rather than to its vascular supply.

* Naunyn, *Arch. f. exp. Path. u. Pharm.*, vol. xxv., p. 301.

† Remak, *Arch. f. Psych. u. Nervenkrank.*, vol. vii., p. 505.

ANALOGY BETWEEN SENSATION AND MOTION.

Summation of Motor Stimuli.—A marked analogy seems to exist between sensory and motor processes in the spinal cord. In a research which Stirling made under Ludwig's direction, he showed that reflex contractions only occur from repeated shocks to the nerve centres—that is, through summation of successive stimuli.

Summation of Sensory Stimuli.—According to Naunyn the same rule holds good for pain, which he regards as also a consequence of summation. For this reason it can only occur when conduction through the grey substance is not too much disturbed, because it is only in the grey substance that summation can take place, the structures of the white columns not being adapted for it.

Summation in Peripheral Nerves.—But if the analogy between sensory and motor processes be true in the spinal cord, we should expect to find something similar in the peripheral ends of nerves.

Tickled to Death.—There is no phenomenon in physiology which strikes me as more wonderful than the extraordinary motor effects which can be produced by the application of extremely slight stimuli to the skin, phenomena which seem utterly disproportioned in their extent to the slightness of their cause. I well remember, as one of the most frightful moments of my life, being nearly tickled to death by a nurse. I do not think I could have been more than five years of age, but the agony of that moment is deeply imprinted in my memory, and I can well believe the truth of the statement that Simon de Montfort, during the persecution of the Albigenses, put some of them to death by tickling the soles of their feet with a feather. Yet of all parts of the body the skin of the soles of the feet is liable to the most constant and severe stimulation in walking, running, and leaping. It has sometimes occurred to me that possibly the different effect of a slight stimulus like the touch of a feather, which causes intense reflex action, and of a gentle but steady pressure of the finger, which gives rise to no reflex action at all, may be due to the stimulation by the latter of two sets of nerves which counteract or inhibit each other. The prolonged course of the nerve fibres in some of the tactile corpuscles may possibly have something to do with this. A similar phenomenon to the effect of steady pressure in lessening reflex action may be observed in the relief afforded by rubbing or stroking a part which has been pinched or bruised, or by scratching an itching spot.

Transference of Hysterical Hemi-Anæsthesia.—But this is much less in degree and is by no means striking, while the transference of hemi-anæsthesia to the other side of the body in hysterical patients by the simple application of a piece of metal or even a wooden button is comparable to death from tickling, both in the extraordinary character of the result and the slightness of the cause.

MODE OF ACTION OF ANALGESICS.

In considering the action of analgesics we must take into account their possible effect on nerve end-

* Lauder Brunton, *Journal of Physiology*, vol. v., p. 14.

ings, peripheral and central, as well as their action upon nerve trunks and nerve cells. It is *a priori* probable that when the blood contains any drug having the power to lower the activity of nerve fibres its action will be exerted upon the peripheral ends before they have received a medullary sheath, and at the central ends where they have lost it, at their junction with nerve cells, before it can act on the nerve trunks. For not only is a nerve trunk sparingly supplied with blood, but the medullary sheath will oppose a certain obstacle to the action of drugs upon the axis cylinder. This appears to be the case with cocaine; for, at a certain stage of poisoning, irritation of the nerve trunks will produce reflex action, although irritation of the skin is no longer followed by any response, a fact which indicates that the peripheral terminations of the nerves have been paralysed before the fibres in the trunk.

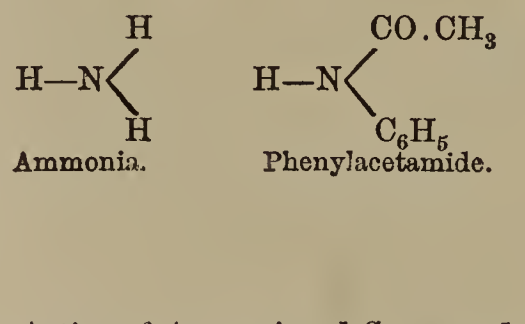
Explanations.—Dealing with hypotheses, as we must do in relation to the action of analgesics, one of the first explanations that occurs to us as probable is that the sensory impulses which in the normal condition would give rise to summation in the cord or sensory ganglia, and, being transmitted to the brain, give rise to pain, may be diffused from one cell to another, and the impulses, instead of causing summation, may even produce inhibition.

Possible Failure of Analgesics to Relieve Pain.—It is evident that if the relief of pain by analgesics is due to the diffusion of a sensory stimulus, so that it does not reach the brain, it is quite possible for a very powerful stimulus to pass to the sensory centre in spite of loss by diffusion. In such a case the pain might actually undergo a process of summation in the cord and be rendered more excruciating instead of being relieved by the remedy.

Irradiation of Motor Impulses Produced by Analgesics.—There appears to be, as I have said, a resemblance between the sensory and motor processes in the cord, and most of the analgesics, as distinguished from the anæsthetics, tend to cause irradiation of motor impulses. While anæsthetics lessen the activity of all the nervous tissues and thus produce drowsiness, loss of sensation, and abolition of motor power and reflex action, many of the analgesics, when pushed to excess, tend to produce excitement of reflex action with diffusion of movement. Thus, when the toes of a frog are slightly pressed it only draws the foot away, but in a frog poisoned by an overdose of some of the analgesics, the stimulus, instead of being localised in the cord and producing a reflex action limited to one limb, appears to be diffused through the nervous system generally, giving rise to tremor over the whole body or even to convulsions and tetanus. This condition is observed when frogs are poisoned by the most powerful of all analgesics, namely, morphine, and it is common to most of the others—cocaine, antipyrin, antifebrin, phenacetine, and exalgine.

CHEMICAL STRUCTURES OF ANALGESICS.

All those substances belong to the aromatic group of bodies, and it is in this group that we are likely to find the most powerful drugs to relieve pain as well as to reduce temperature. The constitution of morphine is very complicated, and we do not yet know what it is; all that can be said about it is that it is probably a quinoline of phenanthrene. Antifebrin, or as it is scientifically called, acetanilid, phenylacetamide, has the simplest constitution of any of the bodies that I have mentioned, for it merely consists of aniline in which one atom of hydrogen is replaced by acetyl. You will see from its formula that it may be regarded as ammonia, in which one atom of hydrogen is replaced by phenyl, and another by acetyl. When regarded from this point of view it is called phenylacetamide. But it may be regarded also as benzene in which one atom of hydrogen has been replaced by NH_2, and thus converted into aniline, and then one atom of H in the NH_2 has been replaced by acetyl $CO \cdot CH_3$. When regarded from this point of view it is called acetanilid. In two long researches on which Dr. Cash and I have been engaged for more than six years, as well as in some experiments in aid of which I obtained a grant from the Royal Society, fifteen years ago, we have been trying to ascertain the effect of ammonia and its various compounds on the one hand, and of substances belonging to the aromatic or benzene series on the other, upon muscle, nerve and nerve centres.



Ammonia. Phenylacetamide. Acetanilid.

Action of Ammoniacal Compounds.—In the course of the research we found that ammonia and its salts stimulate and afterwards paralyse the spinal cord. The stimulant action was marked in ammonia, ammonium bromide and ammonium chloride. The paralyzing action was more marked in the case of the iodide. The compound ammonias have a much more powerful paralyzing action both on the spinal cord and on the motor nerves, especially on the latter, and here again the paralyzing action is most marked in the case of the iodides.

Action of Aromatic Compounds.—The aromatic compounds all tend to produce increased sensibility, incoordination, and tremor, but they do not all seem to affect the spinal cord alike, for while benzene and its haloid compounds, mono-chlor-, mono-brom-, and mono-iodo-benzene produce in frogs tremors which remind one of disseminated sclerosis in man, with ethyl benzene the movements of the frog's legs were short, clapping, and ineffective, reminding one of locomotor ataxy in man. Aniline may be regarded either as amido-benzene, that is, benzene, C_6H_6, in which one atom of hydrogen is replaced by amidogen, NH_2, or as phenylamine, that is, ammonia, in which one atom of hydrogen has been replaced by phenyl C_6H_5.

Action of Aniline.—In accordance with this constitution we found that the symptoms produced by it were different both from those of benzene and those of ammonia. They differ from those of benzene, and resemble those of ammonia in the tendency to more violent spasm and to greater paralysis of muscle and nerve.

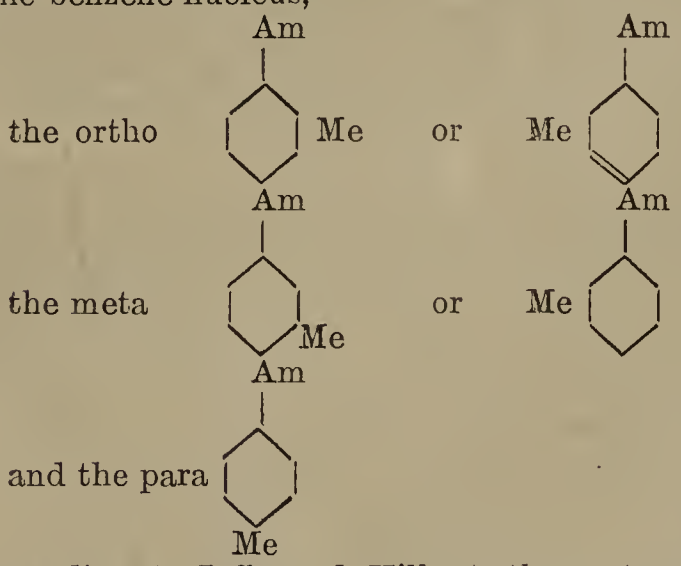
They differ from those of ammonia, inasmuch as the convulsion never assumes the form of true tetanus, the tetanic spasm which the ammonia atom would produce being broken up, so to speak, by the action of the benzene.

Tetanizing Agents ought to be Analgesics.—If the hypothesis be correct that a relationship exists between the power of a drug to cause diffusion of sensory and of motor stimuli in the cord, one would expect that substances which cause tetanus like ammonia, chloride of ammonia, and strychnine ought to act in some measure as analgesics. Indeed, this seems to be the case, for ammonium chloride is sometimes a very successful remedy in the treatment of neuralgia, and strychnine is sometimes useful in the lightning pains of locomotor ataxy. But the fact that ammonia, benzene, and ethyl benzene, while all tending to produce spasm, cause movements of such different kinds, indicates that they affect the motor parts of the spinal cord in different ways. We might, therefore, expect that similar differences would exist in the sensory parts

of the cord, and thus one drug might have a special tendency not only to relieve pain in general, but to relieve a particular sort of pain more than another.

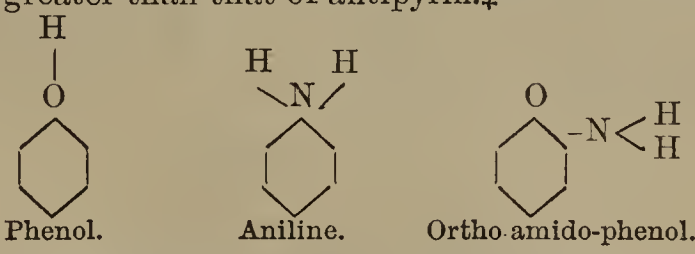
According to Dujardin-Beaumetz,* the power to relieve pain is most marked in those amidogen derivatives of the aromatic group in which an atom of hydrogen is replaced by an alkyl and especially by methyl, while the amidogen derivatives, where no such substitution has taken place, have their antipyretic action most marked. Thus acetanilid, which is an amidogen derivative of benzene, is a powerful antipyretic. It has also an analgesic action,† but when it is combined with methyl its analgesic power is increased.

Constitution of Acetanilids in Relation to their Action.—It is a matter of considerable importance where the methyl is placed. There are three positions in relation to the amidogen group where it can be placed in the benzene nucleus,



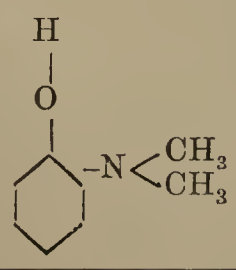
According to Jaffe and Hilbert, the meta-methyl-acetanilid or meta-aceto-toluide is the only one which retains the antipyretic action, the compound in which the methyl is in the para position being inactive, and the ortho compound being toxic but not antipyretic.

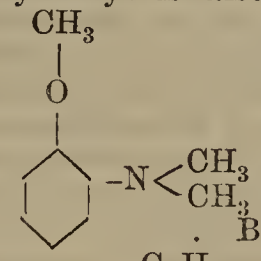
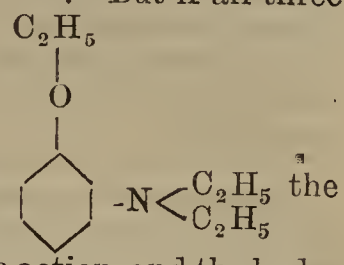
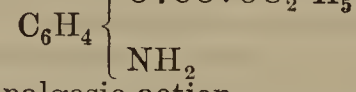
Exalgine.—These compounds have again been investigated by Dujardin-Beaumetz and Bardet, and they have found what the previous investigators missed, that the ortho-aceto-toluide has a marked analgesic power, so great that they think it deserves the name of exalgine. According to them, its power to relieve pain is very marked in all kinds of neuralgia, and is greater than that of antipyrin.‡



Phenol. Aniline. Ortho-amido-phenol.

Effect of Alkyls on Aromatic Compounds.—Another most interesting research on the effect of introducing alkyls into aromatic compounds has been made by Baldi under Schmiedeberg's direction. Curiously enough though phenol and aniline are both poisonous, yet ortho-amido-phenol is not poisonous. If the two hydrogen atoms in the amidogen group in this body are replaced by two methyls,



an extremely weak narcotic substance is produced, and curiously enough the narcotic action is still weaker if the hydrogen in the hydroxyl is also replaced by methyl,  . But if all three hydrogens are replaced by ethyl,  the substance has a distinct narcotic action, and the body,  has a powerful analgesic action.

Prospect of Numerous Analgesics.—As the ways in which methyl may be combined with aromatic bodies are almost numberless, we may expect before long a great increase in the number of analgesics, and not improbably some new ones may far surpass in their power to relieve pain anything that we as yet possess. Before passing from this subject, however, I must indicate a possible source of danger from the continued employment of such analgesics.

Dangers from Analgesics.—We know that the continuous employment of narcotics, such as morphine or chloral, is apt to grow into a habit, and the consequences may be very deleterious to the mental functions. A similar habit, we know, may be established by the use of cocaine, and it is possible that something similar may occur in the case of other analgesics. But there is another possibility which I wish to indicate in addition to this, namely, that just as the brain may become deteriorated by the use of chloral or morphine, so the cord may possibly be injured by the use of analgesics. I have already mentioned that Dr. Cash and I observed in frogs symptoms bearing those of disseminated sclerosis, or of locomotor ataxy in man, and Batten and Bokenham have noticed that antipyrin may produce in frogs a condition like that of spastic paralysis. Cash and I tried to produce symptoms of permanent disease of the spinal cord in frogs by keeping up the poisoning for some time. We were unsuccessful in the attempt, as the symptoms always passed off when the poison was eliminated, but still the conditions in our experiment were very different from those which would occur from the prolonged use of analgesics by a patient, inasmuch as the treatment of the latter might continue for weeks, months, or years, whereas in our experiment time could be counted by days. A circumstance that renders circumspection in the use of analgesics all the more necessary is that various nervous disorders in which the symptoms appear to depend either upon peripheral neuritis or an affection of the spinal cord have lately been described as arising from the use of some of the new explosives, whose chemical constitution approximates somewhat to that of the analgesics. Another action of analgesics which renders caution desirable in their use is their effect upon the blood. Thus exalgine may render the blood incapable of performing its respiratory functions, and thus induce marked lividity, with tendency to collapse, and thus endanger life, while others may destroy the blood corpuscles and produce marked anæmia.

Possible Relation of Leucomaines or Ptomaines to Spinal Disease.—In relation to this, another question suggests itself: whether diseases of the spinal cord may not owe their origin, at least in part, to poisons

* Dujardin-Beaumetz and Bardet, *Compt. rend.*, cviii. p. 571.

† Lépine, *Rev. de Med.*, 1887, pp. 306, 520.

‡ My own experience of this drug has been somewhat disappointing, but it is much too limited to enable me to express any definite opinion.

of the aromatic series, generated either in the intestinal canal or in the tissues of the cord itself.

Use of Suspension.—The remarkable benefit obtained from suspension in cases of locomotor ataxy is one of the most striking discoveries that have been made in therapeutics of recent years. It is very difficult to explain, but I should be inclined to think that suspension merely acted upon the cord in the same way that massage does upon the muscles, by removing the lymph and with it the products of nerve waste; while, at the same time, it may increase the processes of oxidation and repair by promoting a free circulation of the blood.

CIRCULATION.

The state of a patient's circulation has always been regarded as the most important guide the physician can have in regard both to prognosis and treatment. The arms of our college exhibit a hand feeling the pulse as the most characteristic act of a physician.

Test for Life.—As the old adage has it, "While there is life there is hope," and life can never be regarded as extinct while circulation continues. One of the best, if not the best, tests whether life is actually extinct or not is to tie a piece of thread with moderate tightness round the finger. If the person be quite dead no change will occur, but if there be any circulation, however slight, the end of the finger will gradually swell. Even after death has occurred and circulation has ceased in the body generally we are able to maintain the functional activity of isolated organs by means of artificial circulation, so that the lung retains its vitality, the muscles their conductivity, and the glands their secreting power for hours or even for days after the rest of the body to which they belonged are dead. On the other hand, if the circulation in an organ be arrested by contraction, plugging, or pressure upon the vessels supplying it, its function is quickly abolished, although the other parts of the body may be perfectly healthy.

"*Faint Heart never won Fair Lady.*"—Feeble circulation leads to poor nutrition and general weakness and inefficiency, so that a faint heart has become proverbially unsuccessful. A stout, or strong heart, on the other hand, leads to active circulation, good nutrition, general power, and success in life. By keeping up an abundant supply of blood to the tissues it removes the acid products of waste which, as we have seen, powerfully tend to interfere with oxidation. But possibly this is not the only effect of a powerful heart.

Chemical Uses of the Pulse.—According to Fleischl, the shock of the blood sent into the capillaries at each cardiac systole has a mechanical action in aiding the chemical processes of tissue change, in somewhat the same way, though to a less extent, as a blow upon a percussion cap. It is therefore of the utmost importance in the treatment of disease to maintain the action of the heart, and to stimulate it when it is flagging.

Beef-tea as a Cardiac Stimulant.—It is curious to note how a well-grounded practice often holds its own amid changes of theory, and beef-tea still maintains a foremost position among our cardiac stimulants. We have other drugs which increase the power of the heart, and which are most useful in their place; digitalis, strophanthus, convallaria, adonis vernalis, and erythrophlœum, and the whole class of drugs usually known as cardiac poisons. Unfortunately, these drugs do not always give us the result we desire, and at present we are often unable to say why they fail. We do not know their chemical constitution, and therefore we cannot modify it or produce at will drugs having a similar but not identical action, as we can, to a certain extent, in the case of antipyretics and analgesics. Starting from beef-tea, however, we may perhaps obtain what we want. One of the constituents of beef-tea is xanthine. This has a very powerful action on voluntary muscular fibre, but its effect on the heart requires to be more carefully made out.

Caffeine as a Cardiac Tonic.—Methyl xanthine, or caffeine, is now recognized as an important cardiac tonic. Like xanthine, it tends to increase the contraction of muscular fibre, both voluntary and involuntary, and, when its action is pushed far enough, it produces an extraordinary state of muscular rigor. In consequence of this, voluntary muscles dipped into a solution of it frequently contract to the utmost extent of which they are capable, and when applied to the frog's heart it causes the beats to become slower and the heart more and more contracted, until it ceases to beat in systole. In this action it agrees with the other cardiac tonics, like digitalis; but a curious point is here to be noted.

Paradoxical Action of Caffeine.—Although it usually causes firm contraction of the frog's muscle, yet sometimes it causes none at all, and Cash and I have actually found it cause elongation. At present we are unable to explain this curious phenomenon with certainty.

Possible Transverse Contraction and Active Elongation of Muscle.—To me it seems most readily explained on the supposition that muscular fibre, both voluntary and involuntary, not only contracts longitudinally and thus becomes shorter, but may contract transversely and thus become longer. The varying conditions which Cash and I have observed in the frog's muscle under the influence of caffeine, may be explained by supposing that usually the longitudinal contraction is greater than the transverse, and therefore the muscle shortens; that occasionally the longitudinal and transverse contraction occur together and counteract each other, so that the muscle retains its usual length; and finally, that occasionally, though rarely, the transverse is greater than the longitudinal contraction, and therefore the muscle becomes elongated.

Practical Bearing of Physiological Questions.—But some men may say, what does it matter to us whether a frog's muscle, dipped in caffeine, becomes longer or shorter, and what possible connection with medicine can a discussion have on the question whether its fibres contract transversely as well as longitudinally? And yet it is a matter of vital importance to a patient with mitral disease whether the muscular fibres of his heart will shorten sufficiently to expel the blood from his ventricles or whether they will remain quiescent altogether, or actually elongate, so that the heart stands still in full diastole.

(*To be concluded.*)

CHEMICAL SOCIETY.

(*Concluded from page* 80.)

Note on the Determination of the Molecular Weight of Substances in Solution, especially Colloids.—By HENRY E. ARMSTRONG.—The fundamental conception underlying the now very general acceptation of the Raoult methods of determining molecular weight is undoubtedy the conception introduced by Van't Hoff that substances are present in dilute solutions in a state comparable with the gaseous state. But in gases, even in the most imperfect, the individual molecules exercise a very slight mutual attractive influence; otherwise, in fact, the gaseous state could not subsist. When liquefaction ensues, it would appear to be owing to, and to involve the exertion of, such mutual intermolecular attractions; and however continuous the states of gas and liquid may appear from a mathematical standpoint, the continuity would seem to be only that kind of continuity which is observed in dissociative changes generally. Although statistical analysis may support the conclusion that the gaseous state and that which obtains in a dilute solution are comparable, a consideration of the phenomena in the

light of our knowledge of intermolecular relationships cannot at present be held to justify any such assumption. How can it be permissible, in fact, to compare the approximate truth of the laws of Boyl and Gay-Lussac with Raoult's, if in solution an all-important part le played by a factor—the solvent—which, in the case of gases, may be left almost entirely out of consideration; and if water be not a neutral substance and the plenomena of dissolution are, as many believe, of a high order of complexity. The regular and rational results which are obtained on applying the Raoult methods to dilute solutions of substances of known molecular weight are undoubtedly very striking and likely to carry conviction to many minds that the methods are of universal application; but other equally striking coincidences have been observed. Thus it is highly remarkable that the hydroxides generaly—in dilute solutions be it observed—have the same heat of neutralization. This illustration is of special noment, for if we consider the supposed interagents done and disregard the solvent as a chemical agent, it is inconceivable that such should be the case; the result must be in some way a consequence of a higher law not yet clearly perceptible through the haze of complexity which so enshrouds the phenomena of chemical change in solution. It cannot be doubted that the constancy is conditioned by the presence of water in large relative quantity, as most irregular and dissimilar results are obtained if the comparison be made for any other than dilute solutions, just as in the case of the Raoult freezing method (cf. Beckmann, *Zeit. phys. Chem.*, 1888, 638 and 715). If the argument here advanced be admitted, it follows that not only the molecular weight of a substance but also its *specific effect* must be taken into account; and this is undoubtedly the case. It is well known that acids and metallic salts, and indeed electrolytes generally, give abnormal results; they produce too great an effect. Arrhenius has suggested that such compounds are present in solution in a more or less dissociated condition —dissociated into their "*ions*;" that, in fact, such solutions contain a greater number of active molecules than are usually supposed to be present. Allowing for this increase in a manner which he has pointed out, "normal" results are obtained in place of the impossibily low molecular weights which result from the direct reduction of the experimental values. But if we are to accept this view, we must admit that water is a neutral substance, and that it plays no active part in electrolysis; in other words, such a conclusion directly involves the acceptation of a particular hypothesis as to the nature of electrolysis. The arguments on which this hypothesis is based, however, are mostly cases of circular reasoning, and there are many facts which apparently cannot be satisfactorily accounted for by it (cf. 'B.A. Report,' 1888, 356). The one argument in favour of the dissociation hypothesis which is generally regarded as all-sufficient—the argument originally advanced by Clausius, that any E.M.F., however small it may be, produces sensible electrolysis, is one of which it would be premature to accept any explanation as final in our entire ignorance of the inner mechanism of electrical actions—while the electric current is an unsolved mystery, as was happily observed by Professor Rowland in a recent lecture—especially as there are electricians who are of opinion that the Clausius hypothesis is not necessarily the only possible solution, although at present unable to suggest a more satisfactory one. But not only is the explanation of electrolysis which is usually given of a purely "mechanical" nature, and incompatible, therefore, with the view that the solvent plays an active part; it is open also to the objection that in framing it attention has been paid too exclusively to a certain limited number of phenomena, and that the bearing of the facts of chemistry generally as these present themselves to the mind of the chemist has been insufficiently considered. It is probable that this will soon cease to be the case, as signs are not wanting that it will ere long be recognized that chemical changes are essentially electrolytic phenomena, and that we may expect to witness the rehabilitation of Faraday's view of 1834 of "the identity of the force constituting the voltaic current or electrolytic agent with that which holds the elements of electrolytes together, or in other words with chemical affinity." Although it may be urged that the method which Arrhenius has introduced of correcting the results obtained in the case of electrolytes is based on an incorrect interpretation of the phenomena, it does not follow that his method is necessarily a faulty one: on the contrary. Practically the method involves nothing more than the recognition of the fact that it is possible to determine with a close approach to accuracy, and to allow for, the *specific effect* which a compound exercises. This would seem to be the case. Thus Ostwald's experiments show that in the case of acids, for example, in seeking to determine the order of activity in which these may be arranged, practically the same result is arrived at, the order deduced being very similar, when very diverse properties are made the subject of study. Molecular weight does not come into evidence as a determining cause of position in such a series, compounds such as hydrogen chloride, bromide and iodide occurring together and almost at the head of the scale of activity, while hydrogen fluoride is found low down in the series. The compounds in such a series afford "abnormal" values when examined by the Raoult methods in dilute solutions owing to their exercising a greater effect than is produced by compounds which give "normal" values; the extent to which the effect produced is in excess depends on the position in the series, and if proper allowance be made on this assumption a "normal" value is necessarily obtained, *i.e.*, a value consonant with the view which on general grounds we are led to form as to what would be the composition of the molecule of the substance if it were obtained in the gaseous state. But it has yet to be proved that such "corrected normal" values, and those directly found for neutral compounds which can be gasified, uniformly represent the true molecular weights of the dissolved substances and not merely the weights of their fundamental molecules. Whereas in dilute solutions an excessive effect is often produced which would lead to the molecular weight being under-estimated if the result were at once accepted, in the case of concentrated solutions a contrary result is frequently encountered, corresponding to more or less exaggerated estimates of the molecular weight: thus the effect produced by alcohol, for example, in a 32·5 per cent. solution is such as apparently to correspond to a molecular weight of 318 (Beckman). It is not difficult to explain this result on the mechanical hypothesis of the nature of solutions: and still less difficult on the assumption that dissolution is in the main a chemical process: inasmuch as in concentrated solutions less opportunity is given for the molecules of the dissolved substance individually to exercise their specific effect; inasmuch as molecular aggregates are more likely to persist; and inasmuch as the solvent may consist no longer of the substance ostensibly employed as solvent, but in part, at least, of a compound of solvent and dissolved substance. The reduction of the specific effect and the consequent exaggeration of the molecular weight in the cases here contemplated may be said to be due to inter- if not to extra-molecular compensation. But it is also conceivable that intramolecular compensation may take place, and that there may be compounds, the existence of which is not to be foreseen on the dissociation hypothesis, which exercise not an excessive but an inferior effect. The molecular weight of such compounds would necessarily be over-

estimated by the application of the Raoult methods. Benzene and thiophen may be cited as mere illustrations of what is meant by internal compensation. Benzene, it is well known, does not manifest the activity of a "triethylenic" compound, and evidently, in some manner not clearly understood, the six "surplus" affinities of the six carbon-atoms internally neutralise or compensate each other. In thiophen the sulphur appears to function only as a dyad, manifesting no tendency whatever to exhibit a higher valency in the manner so characteristic of sulphur in open-chain compounds: the inclusion of the sulphur in the chain in this case, therefore, involves a marked diminution in its activity. It may be suggested that probably colloids generally are compounds of inferior activity, such as are contemplated on the view here put forward. It is well known that they diffuse with extreme slowness (cf. *Nature*, xxxv., 598), and they are as a class very inert substances, the vapour-pressures of their aqueous solutions, for example, being almost if not the same as those of water alone at the same temperatures. The results recently brought forward by Brown and Morris for carbohydrates are of great interest, but it may be doubted whether they do more than confirm the views previously held with regard to the relative complexity of the several compounds. The same remark applies to the observations of Gladstone and Hibbert on caoutchouc. The fundamental molecule of a glucose must contain at least six carbon-atoms, and that of a saccharon (any member of the cane-sugar group) 12; that of an amylin (or dextrin) therefore most probably contains at least 24 carbon-atoms. A variety of *amyloins* might well result from the conjunction of amylon (maltose) and amylin molecules in various proportions. Maltodextrin,

$$C_{12}H_{22}O_{11} \cdot 2C_{12}H_{20}O_{12} = C_{12}H_{22}O_{11} \cdot C_{24}H_{40}O_{20};$$

inulin,

$$2C_{12}H_{22}O_{11} \cdot 4C_{12}H_{20}O_{10} = 2C_{12}H_{22}O_{11} \cdot 2C_{24}H_{40}O_{20};$$

and amylodextrin,

$$C_{12}H_{12}O_{11} \cdot 6C_{12}H_{20}C_{10} = C_{12}H_{22}O_{11} \cdot 3C_{24}H_{40}O_{20},$$

representing these by the formula assigned to them by Brown and Morris, are apparently such compounds. By duplication of the molecule and withdrawal of the elements of water from such amyloins, "higher dextrins" might be formed which would still be compounds of moderate molecular weight; and even simpler compounds would result if the amyloins were merely to lose the elements of water. Compounds thus formed would undoubtedly be less active than the parent carbohydrates, owing to the "cancelling" of the hydroxyl-groups; and it may well be that they would exercise an inferior effect in solution, and one such as is observed in the case of colloids. It is undoubted that by the application of the Raoult methods a number of most interesting facts have been elucidated, which it is impossible and unnecessary to deny; but it is equally certain that we are only called on to make a rational use of them, and that slavish submission to the facts cannot be demanded. Those who directly accept the conclusions which are drawn, perhaps, have hardly realized what is involved, viz., adherence to the view that in a dilute aqueous solution of hydrogen chloride, for example, as much as 90 per cent. of the chloride is present, not as such but in the form of *free hydrogen and chlorine atoms*; such a conclusion may enable certain mathematical problems to be solved in an apparently satisfactory manner, but it is hardly one which a chemist's common sense would lead him to accept forthwith, in the absence of any explanation accounting for so extraordinary a difference between a dissolved substance at a low temperature and the same substance in the gaseous state at a high temperature. Attention may also be directed to the contradiction involved in the assumption that hydrogen chloride, although not appreciably dissociated when heated alone at 1500° in porcelain (Crafts and Meier), undergoes almost complete dissociation when dissolved in water, whereas nitrogen peroxide, according to Ramsay's experiments, exists in solution as N_2O_4, notwithstanding that it cannot be gasified unchanged, and is almost entirely resolved into NO_2 molecules at a temperature of about 200°.

Dr. Gladstone defended Raoult's freezing method, relying on the numerous coincidences between its indications and those afforded by vapour-density determinations. In illustration he referred to the polymeric C_5H_8 hydrocarbons. Mr. Hibbert and he had found that each of these, when dissolved in benzene, gave a freezing point indicating an analogous molecular composition in the gaseous and dissolved condition. The conclusion from the small lowering produced by colloids that they have a very complex molecule is only in accordance with what has been long believed on chemical grounds. No doubt there are discrepancies and difficulties; but a careful consideration of these must serve to improve our knowledge of chemical and physical theory.

Mr. Hibbert said, that in applying Raoult's method, he had found it advantageous to surround the freezing vessel with an air-chamber. The freezing point was then more definite. The contention of Dr. Armstrong against the applicability of Raoult's method to colloid substances was based on objections to the dissociation theory of electrolysis. It might be true that the only argument in favour of that theory was the fact that the smallest electromotive force was able to produce decomposition in an electrolyte, but the argument was a very strong one, and commanded the assent of nearly every physicist in Europe. With reference to the effect of colloids on boiling point, etc., the question was whether they did or did not produce a real alteration. Recent researches seemed in favour of a positive result.

The Correspondence between the Magnetic Rotation and the Refraction and Dispersion of Light by Compounds containing Nitrogen. By J. H. GLADSTONE, Ph.D., F.R.S, and W. H. PERKIN, Ph.D., F.R.S.

Note on the Oxidation of Paradiamines. By R. MELDOLA, F.R.S., and R. E. EVANS.

Monobenzyl-derivatives of the Phenylenediamines. By R. MELDOLA, F.R.S., and J. H. COSTE.

Note on a Yellow Pigment in Butterflies. By F. GOWLAND HOPKINS.—For the most part the colour effects on the wings of lepidopterous insects are probably due to purely physical causes, and not to the presence of any definite pigment. But in some cases pigments are undoubtedly present. These are for the most part very difficult to isolate; but an exception to the rule occurs in the case of a certain yellow pigment which is found in its purest form in the common English brimstone butterfly. The pigment may also be detected in the wings of a very large number of day-flying lepidoptera. It may be obtained from the wings by simple treatment with hot water, in which it is freely soluble; and it may be identified by its yielding a marked murexide reaction when evaporated with nitric acid and afterwards treated with ammonia or potash. The wings should be first treated with hot alcohol and ether, in which the pigment is insoluble, then boiled up with water, and the yellow aqueous solution filtered while hot. If the aqueous solution be now concentrated to a small bulk, and allowed to cool, the substance separates out as a yellow amorphous precipitate. It may be purified by dissolution in a fresh quantity of hot water, whence it again separates on cooling. Otherwise it may be removed from the wing by the action of dilute alkalis in the cold, and afterwards precipitated by the addition of acetic acid. The common brimstone butterfly yields somewhat less than a milligram of pigment from each insect; larger foreign species, such as those belonging to the genus *Callidryas*,

may yield as much as 4 to 5 milligrams. The pigment is an amorphous powder, insoluble in alcohol, ether, chloroform, and all the more common organic solvents. It is very sparingly soluble in cold, but freely so in hot water. Its aqueous solutions have a fine blue fluorescence and are strongly acid to litmus. The substance is freely soluble in alkalis, yielding with them solutions darker in colour than is its aqueous solutions; from these it is precipitated when neutralized with acetic acid. It thus agrees closely in its physical properties with *mycomelic acid*, a yellow derivative of uric acid; though its yellow colour is more decided than is that of the latter substance. Mycomelic acid does not, however, yield a murexide reaction, while the pigment, as stated above, does so in a very marked manner. If it be boiled for some time with chlorhydric acid it is decomposed, and crystals of uric acid separate out, coloured much in the same manner as when obtained from acidified urine; on prolonged boiling with the dilute acid, urea is formed together with other crystalline substances not yet determined. There can be no doubt that the pigment is a derivative of uric acid, probably allied to mycomelic acid. It appears not improbable to the author that it may indeed be a condensation product of the two acids uric and mycomelic, and progress towards its synthesis has been made in this direction. If it be supposed that the two acids unite, with elimination of 2 mols. of water, to form a new dibasic acid, the acid would yield a silver compound containing 44·44 per cent. of silver. The pigment under discussion gives a perfectly definite silver compound, the amount of silver found in three analyses being 44·61, 44·66, and 44·42 per cent. The author hopes shortly to obtain a sufficiency of the substance for accurate ultimate analysis.

Zinc dextrosate. By A. C. CHAPMAN.—This compound is prepared by dissolving zinc hydrate in the smallest possible quantity of ammonia solution and adding the liquid to a solution of dextrose in 90 per cent. alcohol; its composition is represented by the formula $C_6H_{12}O_6 \cdot 2ZnO \cdot 3H_2O$.

β-Bromonaphthalenesulphonic Acid. By R. W. SINDALL.

Isomeric change in the Naphthalene Series. No. 5. β-Iodonaphthalenesulphonic Acids. By HENRY E. ARMSTRONG and W. P. WYNNE.

Note on the Hydration of Cyanides. By HENRY E. ARMSTRONG.

The Existence of Salicylic Acid in certain Genera of the Liliaceæ. By A. B. GRIFFITHS.—The author states that he has isolated salicylic acid from the leaves, stems, etc., of *Tulipa*, *Yucca*, and *Hyacinthus* in the following manner:—The leaves, stems, etc., cut up into small pieces, were digested with ether and the solution distilled. The residue was treated with distilled water and the solution filtered; the filtrate was then neutralized with potassium carbonate, evaporated, and finally distilled with pure chlorhydric acid. The aqueous distillate yielded on evaporation colourless, prismatic crystals, which were found to be soluble in ether, alcohol, and boiling water; but sparingly soluble in cold water. A solution of the crystals gave with ferric chloride a deep violet colour. A series of combustion analyses of these crystals were carefully performed, which he states gave the composition of salicylic acid. The crystals were found to melt at 130° C.; and on distilling them with lime, phenol and carbon dioxide were readily produced. The author states that he has estimated the percentage of the acid in various parts of the plants with the following results:—

	Tulipa.	Yucca.	Hyacinthus.
Leaves	0·0989	0·1410	0·1103
Peduncles . .	0·0812	—	0·0788
Stems	—	0·1065	—
Bulbs	0·0542	—	0·0483
Flowers . . .	trace	—	trace

The Formation of Sulphones on Sulphonating Naphthalene Derivatives by Means of Chlorosulphonic Acid. By W. M. HELLER.

On the Oxidation Products of Acenaphthene. By T. EWAN, B.Sc. and J. B. COHEN, Ph.D., Owens College.

Schützenberger's Process for the Estimation of the Oxygen in Water. By Sir HENRY E. ROSCOE, F.R.S., D.C.L., LL.D., and JOSEPH LUNT, B.Sc.—The authors find that a series of estimations made on the same sample of London tap water give results which differ 35 per cent. from the mean value, and that the time taken in titrating has a great influence, much higher results being obtained if titration be quickly than if it be slowly performed. The disturbing influence has been traced to the fact that when aerated water is introduced into an atmosphere of hydrogen, as in the usual process, it immediately begins to lose oxygen by diffusion, a fact hitherto overlooked. The result of an oxygen estimation thus depends on the degree of exposure to hydrogen during titration, and results between 0·53 and 7·56 were obtained with the same water by varying the exposure. Under favourable circumstances 20 per cent. of the dissolved oxygen diffuses, whilst in the usual form of the apparatus 50 per cent. of the oxygen diffuses during the estimation. An exposure of three minutes is sufficient to permit all the dissolved oxygen to escape. This explains the return of the blue colour during an estimation carried out in the usual manner, the *diffuscd* oxygen becoming reabsorbed by the reduced indigocarmine. No return of the blue colour takes place on reducing indigocarmine, when free oxygen is absent, and the action has been proved to be due to the supernatant gas, and not to any action occurring within the liquid as Schützenberger supposed. Diffusion also explains the observation made by Schützenberger that twice the amount of oxygen is found when a large amount of reduced indigocarmine is present; in that case the dissolved oxygen is at once acted on and so cannot diffuse. Ramsay and Williams, who have investigated the process, do not obtain twice the amount, but only an increase in the ratio 3 : 5. Diffusion also explains this observation, a smaller vessel having being used in their experiments a larger proportion of the oxygen was found in the usual process, in other words, three-fifths of the whole. The method adopted to eliminate this error, due to diffusion, is to run the aerated water beneath the surface of a liquid containing a measured excess of hyposulphite, and a little reduced indigocarmine as an indicator. In this way the dissolved oxygen is immediately acted on by the hyposulphite and its diffusion prevented. For the standardization of the hyposulphite, the two methods hitherto used were found inaccurate. The copper method being fundamentally wrong owing to a secondary action which occurs between sulphite and dissolved oxygen. The aerated distilled water method, hitherto used with Bunsen's absorption coefficients, the authors show to be inaccurate, giving the values obtained by them, which agree closely with observations made by Dittmar. The new method of carrying out the process and the corrected values for the oxygen dissolved by distilled water give results for which perfect accuracy cannot be guaranteed, but are not far removed from the truth and certainly valuable. The reaction is much disturbed by the presence of free acid or alkali.

Obituary.

Notice has been received of the death of the following:—

On Saturday the 27th of July, Mr. Adam Mennie, Chemist and Druggist, Golspie, Sutherlandshire. Mr. Mennie was accidentally drowned while bathing.

Reviews.

THE USES OF PLANTS.* A Manual of Economic Botany, with Special Reference to Vegetable Products introduced during the last Fifty Years. By G. S. BOULGER, F.L.S.

The necessity for a comprehensive but conveniently portable work on economic botany has long been felt by students. Since the publication of 'Popular Economic Botany' by the late Professor Archer in 1853, there has been no popular handbook in the English language on the subject in its entirety, the nearest approach to one being the 'Treasury of Botany' and the 'Dictionary of Useful Plants,' neither of which fully meets the requirements of the student of the present day. Even so long ago as 1853 Professor Archer pointed out that "vegetable products formed nine-twelfths of the whole commerce in raw produce which employs the mercantile marine of this kingdom;" and during the last fifty years innumerable new vegetable products have been added to the list then known. In fact even the literature of vegetable technology has become so extensive as to have a whole volume devoted to it. The task of presenting to the public a small book embracing in as compact a form as possible useful information concerning all vegetable products, is therefore one requiring considerable discrimination and a very wide knowledge of commerce.

The author commences with a brief review of the state of economic botany fifty years ago and its subsequent progress; this takes the form of an introduction. The work is then divided into nine parts, including respectively articles used in connection with food, materia medica, oils and oil seeds, gums and resins, etc., dyes and tanning materials, fibres and paper materials, timber and other woods, and agricultural and other plants, these being followed by a synoptical index, in which the products are arranged under their natural orders, and by a general index. This is practically the classification commonly followed in exhibition catalogues, and is doubtless the one that in practice is found most useful.

From a general point of view the book strikes one as being admirable as a mere compilation, the information being evidently derived from the "hundreds of works" to which the author states reference has been made in the preparation of the manual. But everywhere evidence is visible that the author has not the practical knowledge of commercial products which is necessary to make the book a really valuable one. It is difficult in many instances to understand from the context whether the product described is used in this country or not. Thus the use of ground nut oil in butterine, of buckwheat in this country for buckwheat cakes (sold in every vegetarian restaurant), and of durra in adulterating flour are not alluded to. Under the head of arrowroot, several starches that do not pass in commerce, as arrowroot, are enumerated; no distinction is drawn between those which come rarely into commerce, such as that of *Tacca pinnatifida*, and those which are regular articles. In the part devoted to materia medica this want of distinction in the relative use of different drugs in one country as compared with another, is much more pronounced. The work is also by no means free from some errors of fact, such as that black mustard *contains* an essential oil (indicating a want of acquaintance with powdered mustard); and that opopanax is a gum resin largely used *in perfumery*, and that araroba is the *pith* of *Andira Araroba*. The statement concerning Balsamodendron Myrrha is also sufficiently wanting in lucidity to puzzle the learned authorities from whom it is said to be quoted.

Regarded, however, from the point of view of careful and industrious research, it is evident that we have here the result of the concentration of a vast and scattered amount of information, often conflicting in character, and it must be admitted that the work is carefully compiled as a whole. The author has also to a great extent counteracted the evil that might arise from his evident want of a really practical knowledge of his subject by referring in a very great number of cases to the works whence the information is taken. As giving a good general idea of the articles mentioned and a reference to works where fuller information may be obtained, the book will doubtless be found useful to students. The synoptical index, at the end of the book, which gives a list of the names of the plants yielding vegetable products, arranged according to their natural orders, is alone worth to the student the moderate price at which the book is published. Such a list it would be difficult to find elsewhere. It is, perhaps, too much to expect any one botanist at the present day to be practically acquainted with the commercial uses of *all* the products of the vegetable kingdom, and it may be hoped that the author, before publishing a second edition of what might be made a most useful work, will consult living experts in each branch of the subject, rather than rely on books which are sure to get out of date.

* London: Roper and Drowley. Small 8vo., Pp. 1–224.

WINE. BY ALEXANDER WEBBER.*

This is described by the author as "a series of notes on this valuable product, and subjects suggested therefrom," and is the result of nearly thirty years study and experience, embodying all the points which are in his opinion worthy of notice. It is a heterogeneous collection of curious facts, humorous and other anecdotes, and quasi-scientific statements, such as (68) "Burgundy is the most blood-making of all wines, so much so that it cannot be recommended for continued daily use;" these are interspersed with some technical information, the whole being arranged in a series of short numbered paragraphs or sections, some only a line or two in length, which give the book a peculiar appearance. The index is very voluminous in proportion, being about a fourth of the whole book.

We will not dispute the author's claims to authority as a judge of good wines, but when he attempts to be scientific, the information he seeks to impart is, to say the least, very archaic. For instance (191) "Alcohol is composed of 4 parts carbon, 2 parts oxygen, 6 parts hydrogen," and (192) "Grape sugar is composed of 4 parts carbon, 4 parts oxygen, 4 parts hydrogen." His other excursions into chemistry are very similar to these. He is very enthusiastic on his subject, and is unstinting in his praise of good wine both as a beverage and as a medicine. The book may have some interest for wine drinkers, but has extremely little scientific value.

* London: E. T. Oliver, 1888. 16 mo. Pp. i.–viii., 1–185.

ANSWERS TO CORRESPONDENTS.

Dugald Taylor.—The plant is some species of spiræa. The specimen sent is insufficient for determination.

Safe.—We think it would be necessary, in the case you describe, to make your label indicate very distinctly that it does not hold out the preparation to be that of the B.P., for which the name you propose to use has been officially adopted as a synonym.

"*Jacques.*"—*Pharmaceutical Era*, D. O. Haynes and Co., 48 and 50, West Larned Street, Detroit, Michigan, U.S.A.; *Pharmaceutical Record Co.*, 66 and 68, Duane Street, New York, U.S.A.; *American Druggist*, William Wood and Co., 56 and 58, Lafayette Place, New York, U.S.A.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. G. Harvie, J. W. Douglas, S. Greenwood, J. H. Fisher, J. Pumphrey and Son, J. C. Sawer, Messrs. Burroughs and Welcome, H. O. Stratford, Dakin Bros., Ayrton and Saunders, Sweet Bread.

LESSONS FROM FIELDS AND LANES.

AUGUST.

Now is the time for an all round examination of the order *Umbelliferæ*. From April to September some of its members are to be found in flower, so that in August both flowers, fruit and leaves may be studied in all stages. From a pharmaceutical point of view the fruit is the part to which most interest attaches, and, as in the *Compositæ*, is an important means of distinguishing the genera and species. The early flowering species have now ripened their fruit, and the most likely to be met with of these are the sweet cicely (*Myrrhis odorata*) and the common hedge parsley (*Anthriscus vulgaris*). The latter is to be found everywhere, and in June, when it is in full flower, attracts the attention of all who are in the habit of travelling by road or rail, be they botanists or not. The former is perhaps more common in the northern counties than in the southern, and is especially attractive to the country children wherever it grows, from its bold looking fruit—three times as large as the majority of umbelliferous fruits—and its strong odour of aniseed. The umbelliferous fruit is known as a *cremocarp*, a name derived from two Greek words meaning a fruit which is hung up. The fitness of the name is nowhere better seen than in the specimens before us—unless it be in the cow parsnip (*Heraclium Sphondylium*), the showiest umbellifer at present in flower, and easily recognized by its broad, robust-looking leaves, fleshy, clumsy-looking inflorescence, and flat, queer-looking fruits. The cremocarp consists of two halves, known as *mericarps*, which, before the fruit is ripe, are joined together, the joint being known as a *commissure*. When maturity has been reached the mericarps—which are simply achenes or one-seeded indehiscent fruits—separate along the commissure and remain attached by their tops each to a little stalk or *carpophare* (fruit-bearer). It is this suspension that gives rise to the name "cremocarp." In many fruits to be found in the shop drawers—such as hemlock, aniseed, caraway, fennel—this characteristic structure is well seen. If a transverse section of any of these be made and examined with a lens it will be noticed that the *pericarp* or outer covering of the fruit (corresponding to the walls of the ovary) contains *vittæ* or oil ducts.

The "fool's parsley" (*Aethusa Cynapium*) is now to be found both in flower and fruit, and should be carefully compared with hemlock (*Conium maculatum*). The plants are in many respects much alike, the chief points of distinction, however, being—hemlock is generally much taller and more bushy than fool's parsley, its stem is generally splashed with purple, its fruit looks more swollen and has wavy ridges, and it possesses both a *general* and a *partial involucre*; this last requires, perhaps, a little explanation, and to facilitate matters we will consider at the same time the structure of the flower and inflorescence of the *Umbelliferæ*. If any of the plants just mentioned as being in flower now be examined it will be found that the calyx is generally very minute or altogether missing, the corolla consists of fine unequal petals, the ovary is *inferior* and the stamens are *epigynous* (on the top of the ovary). At the base of the stamens and on the ovary a glistening honey-secreting surface will be noticed; this is known as the *disk*. The inflorescence is the feature from which the order takes its name, and is known as an *umbel* (from a Latin word meaning a sunshade). The order of expansion in the umbel is *centripetal*, the flowers are all stalked and spring from nearly the same point; sometimes the stalks instead of bearing a single flower branch again so as to form a *secondary umbel*, the inflorescence being then known as a *compound umbel*. A ring of bracts (or *involucre*) is sometimes to be found at the base of the primary umbels, sometimes at the base of the secondary umbels, and occasionally at the base of both. In the first case it is known as a *general* involucre, and in the second as a *partial* involucre or *involucel*. In hemlock both the involucre and involucel are somewhat one-sided, the bracts being reflexed and appearing to thin away towards the other side; in fool's parsley the involucel consists only of three to five long reflexed bracts, the appearance of which even in dried specimens can hardly be mistaken. Both these plants, like most of the umbelliferæ, have compound much-divided leaves.

It is quite beyond the scope of the present article to describe all the species of umbel-bearers now to be found in flower; this must be accomplished with the aid of a standard flora, the intention of the present articles being simply to point out the lines along which the student should work, and to arouse his interest by throwing into greater relief distinctions and points of resemblance which get lost in the wealth of description to be found in text-books.

By dry roadsides, on walls, and in hilly pastures, the delicate blue flowers of the hare-bell (*Campanula rotundifolia*) are now peeping from among the network of green formed by the fronds of the bracken, the boss-fern, and the buckler-fern. This is the true "blue-bell of Scotland," and differs fundamentally from the English blue-bell or wild hyacinth referred to already. It takes the generic name of *Campanula* from its bell-shaped flowers, the corolla being typically *campanulate*. The reason for its specific name is not so evident, because the round *radical* leaves from which it originates have generally disappeared before the plant forces itself on our attention by the production of flowers. Its habitat must be searched in early summer, and then the *ovate-cordate*, long-stalked leaves will be found forming delicate green rosettes. The *cauline* or stem leaves vary in shape from *lanceolate* to *linear*. The whole plant is most delicate and fairy-like, and its name of "hare-bell" is referred by some to the graceful "hair" like flower-stalks, while others trace it to the fact of its frequenting the haunts of the "hare." Its fragility contrasts strongly with the stout, fleshy character of the English blue-bell, and suggests generations of the "sparing diet" which is generally associated with rock and moor, both in respect to their *flora* and their *fauna*. There are in all nine or ten British species of *Campanula*, but most of the others are altogether more florid in their habit, the result of the richer living associated with their haunts; some of them—such as *Campanula latifolia*, and *C. Trachelium*—grow to a height of four feet, and are now among the most conspicuous features of many English lanes; "Canterbury bells" they are called by the country people. The order—*Campanulaceæ*—to which the bell-flowers belong is generally made to include the genus *Lobelia*, one of whose species—*Lobelia*

inflata—is of pharmaceutical interest, although not to be found in this country. Nothing, however, can exceed the delicate beauty of *Lobelia Dortmanna*, a rare species to be found growing in the lakes of Scotland, Wales and the Lake district. We have found it growing very plentifully along the margin of Grasmere, and thought it ample reward for a day's hard walking. The lobelias have an irregular, bilabiate corolla with a split tube, and are thus easily distinguished from the campanulas. The honey of the bell-flowers is secreted as in the umbelliferæ by a *disk* on the top of the ovary. It is protected from unbidden guests by the broadened hairy bases of the filaments which completely surround and cover it, so that it is only the stronger insects, such as bees, that can reach the nectar. The flowers are *proterandous*, and, as in the composites, the anthers shed their pollen on a brush with which the style is provided, before the opening of the flower; they then shrivel up, leaving the as yet unripe style to distribute the fertilizing dust among its insect visitors. If, therefore, a fully-opened flower of the hare-bell be examined it will always be found that the anthers have withered up. It will be noticed that all the bell-flowers are somewhat pendulous or drooping; this simple contrivance suffices to protect the honey from rain.

It is not a far cry from hare-bell to heather, and fortunate is the pharmacist who in August can say good-bye to the laboratory and the counter and court the wild freedom of the moorland and the fell. The order *Ericaceæ*, which claims for its own the bulk of the moorland flora, includes both early and late flowering genera. The fleshy-fruit bearing members of the order, such as the bilberry, the cowberry and the bearberry, mostly flower early, and have now ripened their fruit. The fine-leaved heath (*Erica cinerea*) and the cross-leaved heath (*Erica Tetralix*) are now in full flower, and may be found on any moor. In the former the leaves are in irregular whorls of three and the flowers in irregular racemes, while in the latter the leaves are in whorls of four (cross-like) and the flowers in umbels at the apex of the stem. In the fine-leaved species the flowers are red, while in the cross-leaved they are of a delicate rose tint and have a peculiar waxy appearance. These must not be confounded with the common "ling" (*Calluna vulgaris*), which is by far the commonest kind of heather. In ling the flowers are lighter in colour, more numerous and yet less remarkable looking than in the true heaths. The corolla is shorter than the calyx and the whole plant looks hardy and well suited to its home. The flowers of *Erica Tertralix* are the best for examination; the sepals are four, the corolla is *gamopetalous*, and four toothed, while its shape is variously described as *urceolate* (urn-shaped) and *globose campanulate*. If the flower be cut open it will be found that the stamens are eight and are situated on a honey-secreting *disk* at the base of the ovary. The anthers *dehisce* (shed their pollen) by pores at their apex, a mode of dehiscence characteristic of the heath order; each of them is provided with a tail or *awn* (not to be confounded with the awns of grasses), and this awn has an important place in the mechanism of fertilisation. When an insect enters the flower in search of the honey at the base of the stamens it has to insert its head between the anthers and the corolla, and in doing so it presses down the awns which jerk the anther back and cause a discharge of pollen from the pores; this lands on the front of the insect's head, the exact position necessary to its being placed on the sticky stigma of the next flower visited. Would it not be possible for the chemist who lays himself out for the sale of "heather-honey" to attract and please his customers by showing a diagram or model of the mode of collecting it, accompanied by an explanation of the wonderful inter-dependence of the honey making flower and the honey stealing bee, each incapable of producing healthy offspring without the help of the other?

Mountainous districts should now furnish examples of an ericaceous plant of pharmaceutical interest—the bearberry (*Arctostaphylos uva-ursi*); it may be recognised by its trailing branches, leathery *obovate* leaves and red fruit. The juniper (*Juniperus communis*) is now to be found in fruit in the same district, and to the pharmaceutical student its "berries" are its most interesting feature, their interest centering in the fact that they are not berries at all. Juniper is a shrub belonging to the same order as the fir. It has *subulate* (awl-shaped) leaves which stand out from the branches like thorns; in Savin, another species of the same genus, the leaves are pressed down on the branches and this feature is generally relied on to distinguish one from the other. As indicated by the name of the order (*Coniferæ*) to which it belongs, the fruit of juniper is a *cone*, or rather the modification of it known as a *galbulus*. A cone is a compound fruit which is formed from a spike of female flowers with woody bracts; the galbulus is a cone in which the bracts (or *scales*) have become succulent. If a juniper fruit be examined closely a cross-like marking may be seen at the apex, showing the points of union of the scales; these are generally three in number, and each has at its base one or two seeds. These seeds are not contained in a seed-vessel, or, to put it in another way, the ovules are destitute of an ovary; it is from this fact that the cone-bearers are classed among naked seeded plants or *Gymno-sperms*.

Some members of the gentian tribe are now doing their best to brighten up the hilly pasture-land with their pale purple, somewhat awkward looking flowers. *Gentiana campestris* and *G. Amarella* are the most common species. *Gentiana lutea*, the medicinal species, is not found in this country; it frequents the mountainous parts of Central and Southern Europe, and differs from its British relatives in having yellow flowers—from which the specific name of "*lutea*" is derived. Yellow flowers are usually considered to be much more primitive than blue and purple ones, and in the gentians we have an excellent example of the collateral development of colour and form. The medicinal gentian has yellow open flowers which make no attempt to hide or protect their honey stores, while the more highly developed purple gentians of our home hillsides have acquired the habit of closing their flowers in dull weather so as to protect their honey from rain, and keep out unbidden guests by means of hairs and other contrivances.

A hillside ramble would be incomplete without some notice of that daintiest, yet wiriest of plants,

the wild thyme (*Thymus Serpyllum*); it is to be found growing on rock which has scarcely a covering of soil, and always strikes one as looking very much at home, whether on a knoll of rotting trap rock, which its roots only hold together that they may get from it the nourishment they require, or when disputing with the hillside grasses the inch of soil in which they both happen to have been stranded. It is a member of the *Labiate* order, and like many of the other members of the order, has a fragrant smell, to which it no doubt owes to a great extent its great number of insect friends. The flowers are of two kinds, one being large and *hermaphrodite* (that is, having both male and female organs in the same flower), while the others are smaller and possessed of pistils only.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 84.)

In the Paris Exhibition products of the distillation of wood are exhibited in a few cases, especially in those of Kestner and Co., of Bellevue, and Camus and Co., of Paris, the latter including, besides acetone, acetates and methyl alcohol, a series of substances designated as "pyrolignites" of lead, copper, soda and lime. Alcohol does not occur in the class of chemicals and pharmaceutical products as a direct exhibit, it being included in the group of Alimentary Substances. But there are one or two exhibits that have to do rather with products of the rectification of ordinary alcohol and allied compounds. Thus G. Claudon, of Conflans-Charenton, shows, besides absolute alcohol and ordinary industrial alcohol, such compounds as propylic, butylic, isobutylic and amylic alcohols and hydrate of pinacone; whilst E. Porion, of Wardrecques, together with similar products, shows a glass model of the "appareil Durin" used in the rectification. It is pretty generally known that in France potatoes and beet are largely used as materials for the production of alcohol and some statistics given in the agricultural section throw some light upon the importance which the beet has now attained in the sugar and alcohol industries. In the arrondissement of Melun, with an area of 109,000 hectares, there were in 1886–87 three sugar factories, using in the year 47,849 tons of beet (taking 1,000 kilograms roughly as equal to a ton), and producing 4,318 tons of refined sugar. A fourth factory has since been opened, and these quantities have been proportionally increased. In addition there are in the arrondissement no less than twenty-eight distilleries, all using beet as the raw material, except one, which uses the Jerusalem artichoke. The average annual consumption of beet in these distilleries is given as upwards of 72,000 tons and the production of spirit from all sources in 1886–7 as nearly 1,000,000 gallons. It appears, however, that the yield from the beet varies very much in different seasons; for whereas in 1885–6 the yield of "pure spirit" from the ton of beet was about nine gallons, in 1886–7 it amounted to about twelve gallons.

Probably the industries most numerously represented among the Chemical and Pharmaceutical Products in the Paris Exhibition, are the manufactures of soap and candles. In one part of the French court the visitor comes upon case after case of soaps of various kinds, a large proportion being of the kinds known as Castile soap and "marbled" soaps in blues and reds. Some of these soaps are of very fine appearance, and in this respect fully maintain the reputation of the French manufacturers, but a simple inspection of them through glass windows does not allow of any true judgment as to their relative qualities. To mention one point, those who have had to use continental-made soap, or handle linen washed with it, will know how often the English nose is offended by the odour depending upon the fat that has been used as a material for the soap or some coarse perfume introduced to cover it. Whether this objectionable property may reside in any of the soaps shown cannot be stated without closer examination; but it seems somewhat significant that throughout the exhibition the fact is impressed upon the public by advertisement that in the lavatories an English-made soap is provided for use. For the same reason it would be useless to mention the names of particular firms exhibiting, and it must suffice to say that some of the cases contain also soft, lime and resin soaps, and in addition there are several of the so-called "cleansing soaps" and pastes that have come so much into favour the last few years, one of them avowedly containing a ferruginous mineral as a constituent. There are a few toilet soaps shown in this court, but more of them will be found with the perfumery among the group of Furniture and its Accessories. In several instances candles and soap appear together in the same exhibit, but in most they are shown independently. Several exhibitors show "bougies à trous," of which J. Urbain, of Ivry, claims to be the inventor. Of course, "stearin" is the material most prevalent, and stearic acid, oleic acid, glycerin and products of the saponification of fats are to be seen in several cases. But paraffin, spermaceti and wax are also there, and wax especially is used for those wonderful candles, some of which may be seen six feet high and ornamented with colours and gilding from top to bottom, that are prepared for ecclesiastical purposes. As to the fatty materials used as a basis for the soaps and candles one can but speculate. The "savons blancs" (white Castile soap) are supposed to be made with pressed olive oil; the "savons verts" with olive oil that has been extracted from press residues by means of carbon bisulphide; then palm oil is an acknowledged soap material at Marseilles, and as in one case suint potash is exhibited, it would seem that wool fats play some part. But outside these, enormous quantities of fats and fixed oils are obtained from other sources that will be referred to subsequently when describing some of the raw materials exhibited in the colonial and foreign courts. Suffice it to say now that one house in Marseilles alone claims to have crushed during the year 1888 no less than 60,000 tons of seeds,—sesame, ground nut, colza, poppy, and ricinus,—with the production of 24,000 tons of oil, and 36,000 tons of cake. Another house in the same city, N. Reggio, claiming to have crushed 10,000 tons of seeds during the same time, makes a specialty of castor oil for pharmaceutical purposes, and gives the quantity of Bombay ricinus seeds crushed during the year as upwards of 1500 tons. In connection with this subject may be mentioned the exhibit of F. C. Hérubel, of Petit-Quévilly, which includes among some products of

castor oil, the sulphoricinates of ammonia and soda as liquids. In the case also of A. Falcony, of Asnières, who exhibits glycerine, there are two substances labelled with the unfamiliar names "glycocore" and "glycogonine." Another glycerine compound, nitroglycerine, as dynamite, is represented in one case, but presumably only in name. There are a few special exhibits of the industry of recovering fats by means of bisulphide of carbon. The Marseilles Sulphide of Carbon Company shows among other things a very dark olive oil removed by this agent from the pulp and stones of olive residues, whilst among the waste substances worked up by means of the bisulphide is the refuse fat that has done duty as a lubricant for railway carriages. Lubricants and machine oils generally are themselves well represented in many cases, both with bases of animal and other fats, and ceresin and heavy petroleum. Here, again, it is difficult to select any for special reference, but it may be mentioned that in the case of Richard frères, of Marseilles, a lubricant apparently having Baku petroleum for its basis is demonstrated to be neutral by the artifice of allowing some to stand in a dish in contact with copper. In fact, it is noticeable that Russian petroleum and its products are kept well to the front in this exhibition. In the Russian court there is a large and interesting collection, shown by S. M. Schibaeff and Co., of Baku, of the crude naphthas and their products obtained in the neighbourhood of the Caspian Sea. With this exhibit is furnished much information on the general subject, a few points from which may be useful. The utilizable "naphtha" obtained from the Caspian district is said to be of three kinds, designated as light "naphte balachané," sp. gr. 0·868, flashing point, 35° C., point of combustion, 45°; heavy "naphte balachané," sp. gr. 0·885, fl. pt. 46°, pt. comb. 58°; and white "naphte surachané," sp. gr. 7·778, fl. pt. at ordinary temperatures. The number of wells is between 150 and 200, which yielded in 1888 about 3,300,000 tons of "naphtha," from which was obtained about 1,000,000 tons of "petroleum," that term being applied in Russia to a liquid with a flashing-point not below 28° C., and a sp. gr. of 0·823-0·824. About one-third of this quantity is used in Russia, and the remainder is exported. The "light naphtha," when worked carefully, is said to yield nearly 40 per cent. of "petroleum," and the "heavy naphtha" nearly 33 per cent.; whilst the "white naphtha" is converted by a simple refining, without distillation, into a burning material, which from its lightness ought to be classed among the "benzines" rather than among the "petroleums." Three types of "petroleum" are shown: "petroleum No. 1," sp. gr. 0·810 to 0·812, fl. pt. 30°; "petroleum," sp. gr. 0·823 to 0·824, fl. pt. 28° to 29°; and "australine," sp. gr. 0·834 to 0·840, fl. pt. 58° to 60°, pt. comb. 70° to 75°. Two "benzines" are obtained, flashing at ordinary temperatures; one of these, sp. gr. 0·717 to 0·720, is said to be burnt in special lamps and used in the india-rubber manufacture; the other sp. gr. 0·758 to 0·762, is at present without useful application. Intermediate between the "petroleums" and the lubricating oils come "pyronaphtha," sp. gr. 0·860 to 0·865, fl. pt. 99° to 110°, and "huile solaire," sp. gr. 0·870 to 0·875, fl. pt. 114° to 120°. These, it is claimed, are deserving of attention for illuminating purposes, but it is admitted that at present no lamp is known in which they can be burnt for ten or twelve hours, their power of capillary action not being sufficient to carry them up through a wick, whilst they ignite at too low a temperature to allow of their being stored near a flame, as in the case of the vegetable oils. The remaining products from the residues left at this stage are lubricating materials of varying consistence and degrees of viscosity, the final residue or tar being used in making artificial fuel. Among other articles present in this exhibit are three substances represented to be true soda soaps, formed by the combination of the alkali with "acides de divers naphtes." They are described as being soluble in water without any deposit, and as being utilizable like ordinary soap. Among other petroleum products worthy of mention is a display in the case of Deutsch and Sons, of Paris, of a number of fine "carbons" in tubes and candles.

Glue is another industry that is very well represented in the French court, and in several cases there are exhibited skin, bones and other materials used in the extraction of the products exhibited. Thus in the case of F. Poly, may be seen a quantity of "os dégélatinisées" that have the appearance of moulded pumice. Some of these exhibitors also show isinglass and clarifying materials having that substance for a basis. Blood albumen, another substance used for clarifying purposes, will be found in the case of Bourgeois and Co., of Paris, who also exhibit what they call "sang cristallisé," prepared especially for the sugar and wine industries. Closely allied with the foregoing is the manufacture of animal charcoal, which is shown, together with glue and fat from bones and manure made from the residues, by Tancrède Brothers, of Paris, and to these Coignet and Co. add one other product, namely, phosphorus.

A number of other industries are included within the limits of the Chemical and Pharmaceutical Products class, but which can hardly be dealt with at length in this report. Bleaching liquids, under the name of solutions of hypochlorite of soda, or as eau de Javelle, are shown in several cases. Peroxide of hydrogen is also represented and its effect demonstrated by accompanying displays of bleached feathers, wool, hair, ivory and sponge. Then there are varnishes, blackings, metal cleansing pastes and liquids, concerning which it can only be said that their name is "legion." But it would not be right to close this portion of the report without referring specially to the extent and importance of the exhibits of india-rubber goods both in the French and British courts. In these cases, besides waterproofing and water-tight boots, bands and tubing, the chemist and pharmacist may stumble across many little knick-knacks that may do him service. The development of this industry has provoked a demand for the raw material that has drawn supplies from many countries until recently unsuspected of growing caoutchouc trees. This is well illustrated in the case of François, Grellou and Co., of Paris, where are exhibited samples of rubber from Java, Senegal, Brazil, Mozambique, Peru, Gabon, Borneo, Madagascar, Assam, Nicaragua, Ceará, Sierra Leone, and other places. Gutta-percha goods are also shown, but not nearly to the same extent.

In the succeeding notice it is proposed to refer more particularly to some of the raw material that is to be found in the colonial and foreign courts.

(*To be continued.*)

THE SPONGE FISHERY AND TRADE OF THE UNITED STATES.*

BY RICHARD RATHBUN.

(*Concluded from page* 26.)

(*b*) *The Florida Sponge Fishery.*—The Florida sponge ground forms three separate and elongate stretches along the southern and western coasts of the State. The first includes nearly all of the Florida reefs; the second extends from Anclote Keys to Cedar Keys; and the third from just north of Cedar Keys to St. Mark's in Apalachee Bay. The Florida reef grounds have a linear extent of about 120 miles, beginning near Key Biscayne in the north-east, and ending in the south, at north-west channel, just west of Key West. The north-western half of the grounds is very narrow, having an average width of only about 5 miles and being limited to the outer side of the reefs. At about the Matacumbe Reefs, the grounds broaden out so as to cover the entire width of the reefs, which are much broader here than at the north. The entire southern half of the grounds has more or less the same breadth, which is about 13 or 14 miles. The second sponge ground begins just south of Anclote Keys, with a breadth of 7 or 8 miles, but rapidly broadens out towards the north to a width of 15 miles, which it maintains from a point about opposite Bay Fort to Sea Horse Reef, just south of Cedar Keys. The total length of this sponging ground is about 60 geographical miles: its distance from the shore varies somewhat; at the south, the inner edge approaches within 4 or 5 miles of the mainland, and comes close upon Anclote Keys; but throughout the remainder of its extent it is distant 6 to 8 miles from the shore, until it touches the shallow bottom and reefs of Cedar Keys. The depth of water on these grounds, as indicated on the Coast Survey charts, ranging from 3 to 6 fathoms, but many portions are undoubtedly shallower than this. The northern ground, which maintains a nearly uniform width throughout, is about 70 miles long by about 15 miles broad. It approaches to within about 5 miles of the shore, and terminates just off the mouth of St. Mark's river; the depth of the water is the same as upon the next one to the south; from three to six fathoms.

The total area of the Florida sponging-grounds, which are now being worked, including also those that were formerly fished upon but have since been more or less abandoned, may be roughly stated at about 3000 square geographical miles. This probably does not include all of the sponge grounds occurring in Florida waters, for the fact that new areas are being constantly discovered, would indicate that there might still be more to find, and it is certain that no very strenuous efforts have been yet made to extend the grounds already known, the discovery of new ones having generally been made by accident.

The Sponging Vessels and their Outfits.—General account.—The sponge fishery of the Florida coast differs greatly from that of the Mediterranean, in that sponges are not obtained by divers, but by means of hooks fastened at the end of a long pole and managed from a small boat. In the former region, small vessels of from 5 to 50 tons measurement are employed to visit the grounds, to afford quarters for the men, and to bring home the catch. These vessels are mostly of light draught and schooner-rigged, having proportionately large decks on which to carry boats, working gear, and the sponges as they are taken. The holds are of considerable size for storing dried sponges, and the cabins generally small, indicating a sacrifice of comfort to working room. Each vessel carries, according to its size, from five to fifteen men, one as cook, and the remainder (always an even number) as fishermen, and also a small yawl-boat to every two fishermen to be used by them in securing the sponges. In addition to the implements for taking sponges, they are provided with a sufficient quantity of provisions, wood and water for the trip, lasting from four to eight weeks.

The working outfit of a Florida sponging vessel consists simply of a few small yawl-boats called dingies, and a supply of sponge hooks and sponge glasses. Many of the dingies are built by the fishermen themselves; they are from 12 to 15 feet long, and 4 to 5 feet wide, and are built of the lightest and strongest material obtainable, the frame of mulberry or white oak, and the planking of juniper or southern white cedar. The idea is to have the boats light enough to enable two men to haul them in and out over the side of a vessel, and yet strong enough to withstand the rough handling to which they are subjected, and to safely carry the rather heavy load resulting from a half day's catch. While gathering sponges it is necessary to scull the dingy from the stern, and, for convenience in so doing, the following form of sculling-notch has been introduced:—A piece of oak plank about 6 inches wide and a foot long is notched at one end to fit an oar, and inserted at the other between two guiding strips securely fastened to the stern sheet. The sculling notch is placed at one side of the centre of the stern sheet and is made to be easily removable in order that it may be taken out of the way when not needed.

The sponge hooks are made of iron, with three curved prongs, measuring in total width about 5 or 6 inches. The entire length of a hook is about 8 inches, the upper end being made into a strong socket for the insertion of a pole.

The sponge glass as originally constructed consisted of a small, square, wooden box having a glass bottom. More recently, however, this form has given way to an ordinary wooden water-bucket, the wooden bottom of which is replaced by one of plain window glass fastened in by means of putty; the inside of the bucket is painted a dark colour. In using a sponge-glass, it is placed upright on the surface of the water and the head is thrust down into it as far as convenient. In this way very small objects can be distinctly made out on the bottom even at a considerable depth. It is customary to leave the handle or bail on the bucket, and allow it to pass round the neck when in use, so that when a sponge is discovered the sponger is not delayed in grasping his hook and bringing it into play.

The Key West Fleet.—The sponging vessels of Key West are the pride of that place, and with good reason, as they are trim and fast sailers. They rank next after the fishing smacks in size, ranging in measurement from 5 to 45 tons, and are nearly all schooner-rigged. Many of them were built or rebuilt at Key West, or in that vicinity, and like the smacks are strongly put together. The frames are made of Madeira wood, red cedar and dogwood, and the planking of yellow pine or cypress. Before being painted, every outside seam and crack in the hull is filled with beeswax to render it tight and form a smooth surface. The masts, sails, rigging and ironwork are all of the best quality and all neatly fitted. In shape they are rather wide for schooners, but being shallow and

* From the Report of the United States Fish Commission. Reprinted from the *Oil, Paint and Drug Reporter*, June 5.

loaded with canvas, work well under sail. The mainsail and jib are of the ordinary shape, but the foresail is generally a "lug" sail, that is having no boom, and so wide as to extend aft beyond the mainmast. Otherwise it is similar to the foresail ordinarily used on schooners.

These vessels are all of light draught and provided with centre boards. The hold, from the after end of the centre board to the bow, is entirely clear and unobstructed to afford ample space for the storage of sponges, boats and hooks. The cabin, extending from the bulkhead at the after end of the centre board to the stern, is generally a small affair with but few conveniences, and is composed almost entirely of sleeping compartments for the large crews that live on board. The trunk of the cabin is therefore very small in proportion to the size of the deck, the hatches being also small as well as the bitts and windlass gear forward. Cooking is done on deck, on a stove that is boxed up and kept between the masts. When ready to start for the sponge reefs, there is but little empty space anywhere on board; the decks are crowded with boats and men, and with piles of spare ropes, anchors, sponge poles, water glasses, etc., while below is stored a large quantity of wood, water and provisions. The sponging vessels of Key West are quite as expensive to build as the fishing smacks, and according to the statements of several builders and owners cost on an average about $3000 complete for a vessel of fifteen tons.

The Key West sponging fleet consisted in 1879 of eighty-six vessels, all but five of which were schooner-rigged, the balance being sloops. The combined measurement of this fleet, with the exception of four vessels, the tonnage of which was not ascertained, was 1105½ tons. The tonnage of each vessel ranged from about 5 to 45 tons. Two vessels were under 5 tons; thirty-six between 5 and 10 tons; thirty-five between 10 and 20 tons; three between 20 and 30 tons; two between 30 and 40 tons; and four between 40 and 45 tons. The total value of the vessels of the fleet was $151,350. The crews numbered most commonly either five, seven, nine, or eleven men each; the total number of men in the combined crews of the entire fleet was seven hundred and forty-four. The majority of these were Americans and a large percentage negroes; the remainder were either from the British West Indies or of unknown origin. In addition to the vessels described above, there are many small boats which fish for sponges about the reef.

The Key West vessels are divided into two distinct fleets, one called the "Bay Fleet" being composed of the larger vessels that cruise on that part of the coast lying between Anclote Keys and Saint Mark's, and the other, called the "Reef Fleet," consisting entirely of the smaller vessels that gather sponges on the reefs from Key West to Cape Florida. The vessels of the bay fleet are gone from home from one to three months according to their capacity and the success of their cruise, while those of the reef fleet are absent from one to two weeks only.

The bay fleet vessels send out two men with each dingy, one to scull and one to hook the sponges, but those fishing on the reefs assign only one man to a dingy, and he can easily manage both the sculling and the hooking, as the reef areas are smooth, clear and shoal, and the currents not strong.

The Apalachicola Fleet.—The vessels engaged in the sponge fishery from this port are all of small size and light draught, and are mostly schooner-rigged in the ordinary American style. Many of them were formerly owned in Pensacola or New Orleans, where they were probably built, while others were built up from large ship's boats and small yachts.

Taken as a class they are rough and homely and rather poor sailers, thus contrasting strongly with the Key West fleet. The total number of vessels in the Apalachicola fleet in 1879 was sixteen, one being sloop-rigged, the remainder schooner-rigged; they ranged in size from 5½ to 36½ tons, the total measurement amounting to 154¾ tons. The combined crews numbered eighty-four men.

In addition to this fleet of vessels there were a few small open boats engaged in the sponging from Apalachicola, which were not entered upon the custom house books. The estimated value of the sixteen vessels of the regular sponging fleet was $10,700, or at the rate of about $71·30 per ton; and of the small open boats about $800. The outfit of these sponging vessels consisted of some forty dingies (two or three to each vessel), valued at $35 each, or $1400 for the entire number; and of sponge hooks and sponge glasses, estimated to be worth about $100. The total amount of capital invested in the sponge industry at Apalachicola in 1879 was, therefore, about $13,000.

Method of Conducting the Sponge Fishery.—General account, including Key West.—The Florida sponge fishery may be carried on throughout nearly the entire year, providing the weather continues favourable. The principal season for work is from May or June until the last of August, for during that period the water is generally smoother and clearer than at other periods; but it sometimes happens that the best conditions of water occur in winter, and at such times the fishery can be conducted with great success. The winter sponge fishery, when it can be carried on continuously, is said to be even more profitable than the summer, for the fishermen claim that sponges average larger in the winter than in the summer, though they cannot account for the fact. Decomposition does not begin in cold weather for three or four days after the sponges are taken. During the usually stormy months of September, October and March, nearly all the vessels are laid up, for the owners, being unable to insure them, are unwilling to risk them off the coast for such long periods when heavy gales may spring up at any time.

At the commencement of a fishing season, the owners of vessels appoint their captains, who, in turn, select their crews. As soon as the crew and outfit of a vessel are ready, it sails from port, and in from one to three days is on the fishing-ground and at work. The cook remains on board, keeps the vessel under way, and prepares the meals, while the spongers pair off into the dingies. Of the two men who occupy the dingy, one is called the "sculler" and the other the "hooker." The former stands in the stern of the boat and sculls it slowly and steadily forward, being prepared to stop it and hold it exactly in place at a moment's notice from the "hooker" or "bowman," who kneels down amid ships, or at the bow with the upper half of his body projecting over the side. The duty of the latter is to scan the bottom, and, as soon as a sponge of sufficient value comes into view, to fasten into it by means of his long sponge-hook, and bring it to the surface. It is very evident that both "sculler" and "hooker" must be men of considerable experience and dexterity in their respective occupations, in order to work together advantageously. The instant a sponge is sighted, the boat must stop, and without a moment's delay the hooked pole must be plunged downwards, sometimes to a depth of 25 to 35 feet, with sufficient accuracy to pierce an object which at the most is only a few inches in diameter. As might be expected, the task of hooking sponges is much more difficult, when, as frequently happens, the water is rough or clouded by sediment. To make his position more comfortable and prevent sores and blisters, the hooker ties sponges about his knees where they would come in contact with the bottom of the boat, and also across his chest to raise it above the rail. His posture

is an exceedingly tiresome one, lying as he does with his head and shoulders over the rail, and he must retain it all day.

Formerly, when sponges were collected only in shallow waters, no difficulty was experienced in detecting them with the unaided eye, but of late years, since they have been gathered more abundantly in depths of 20 to 35 feet, it has become necessary to make use of the sponge-glass already described. The "hooker," wearing the handle of his rude glass about his neck, has both hands left free, when he wishes to use the pole, which his companion first hands to him, having started it over the side of the boat. In addition to his skill in detecting a small object on the bottom, and bringing it to the surface, he must be able to tell at sight whether it is a valuable sponge or not; and if not, pass it by. Some sponges grow so firmly attached to the bottom that it is almost impossible to pull them off with the hook. Instances are cited where the hooker, in his strenuous efforts to loosen such a specimen from the bottom, has actually pulled the bow of his boat under water and caused it to partially fill. Sheepswool sponges are said to be the most difficult to detach, and yellow sponges the easiest of those growing in moderate depths of water. When a small sponge attached to a large one is taken, it is pulled off and thrown back. These sponges are said not to attach themselves again but to remain loose at the bottom, and to be rolled about by the movement of the water. When they are again taken, showing no point of attachment, they are called "rolling johns." The useful sponges taken by the fishermen, are so-called sheepswool, boat, yellow, grass, and glove sponges; and the worthless ones which they sometimes hook, are termed by them "loggerheads," "bastard sheepswool," "bastard yellow," and "finger sponge."

The gathering of sponges from the depths in which the fishing is now mainly carried on, on the west coast of Florida, is very hard work, and only the strongest and most skilful men can succeed. Capt. Ben Pearson, of the schooner *Champion*, and others, state that they hook up the sponges from 30 and 36 feet of water. When working in such depths as these, they have to contend with stronger currents and rougher water than in shoaler localities, and in addition there is the unwieldiness of so long a pole. Sponges from these depths are, however, superior in quality to those from inshore.

Collecting goes on at all times when the water is smooth and clear—conditions not always met with. Some of the Key West spongers have partially removed the inconvenience of rough water by distributing oil over the surface, and are thus enabled to work more continuously. A teaspoonful of oil, it is said, will produce a smooth surface for as long a time as a small boat cares to work in one spot. Shark oil is considered the best for this purpose, though no reason for it is given. In summer many Key West people kill the nurse-shark and dry out the liver for this oil, which sells at $1 a gallon. During the day the dingies work steadily along the reefs, picking up sponges here and there until dinner time or night arrives, when they return to the vessel. When on the sponging-grounds the men breakfast at daylight, and soon after are in their boats, prepared for work. At dinner-time—12 o'clock—the cook blows a horn to recall them, and after a short rest the work continues until sunset. Should a boat wish to regain its vessel at any other time, in order to leave sponges, an oar is hoisted blade up as a signal, whereupon the cook sails the vessel to that vicinity. As soon as the sponges are brought on board, they are carefully spread over the deck of the vessel in their natural upright position, so as to allow the slimy matter, called "gurry" by the spongers, to run off easily. During the first stage of decomposition, they smell strongly of ammonia, and are extremely noxious to most persons unaccustomed to the odour. Later the ammonia scent disappears, leaving a stronger one very similar to that of decaying seaweed. The fishermen say that after having endured this stench for a few days they do not notice it at all.

Some of the larger of the sponging-fleet remain at anchor on the "grounds" through the night, but the majority run inshore, a distance of ten or fifteen miles.

It is the general custom among them to go to the place for curing their catch every Friday night, carrying with them the results of a week's work. Each vessel has one or more crawls (an inclosure of stakes 8 or 10 feet square, situated in water 2 or 4 feet deep) at the rendezvous. A small island, called Rock Island, located a short distance south-east of Saint Mark's River, and near the sponging-grounds, is the principal place for these crawls, and is visited by both Key West and Apalachicola vessels. The latter have a number of crawls near the Saint Mark's lighthouse, and the former have them scattered all along the coast from Rock Island to the Anclote Keys. Many of the reef fleet have their crawls at Key West and cure the sponges at home.

The Saturdays are passed in depositing the past week's catch, and cleansing the deposit of the week before. Sponges as kept on deck will generally die and lose the greater part of their gelatinous matter in one or two days; therefore, when thrown into the crawls, the chief part of the curing to be done is the removal of the outside skin or covering. In cold weather they live much longer than when it is warm, and it is sometimes difficult to cure them properly in winter. Vessels at Rock Island have sometimes been unable to cure their catch there and have brought them all home to die and then be cured.

In summer, and when they are dead at the time they are placed in the crawl, the week's soaking that they undergo softens all the remaining slime and skin they contain, and a little squeezing and beating with a short, heavy stick, called a "bruiser," suffices to cleanse them perfectly. They are squeezed as dry as possible and thrown into a dingy, to be strung on rope-yarns 6 feet long, in the form of bunches, which are first strung up to allow the sponges to bleach and dry, and afterwards stowed in the hold. As soon as dry they are in condition to sell to the wholesale merchants of Key West and Apalachicola.

When vessels have crawls in company and employ a watchman, the cured sponges are left ashore until they are ready to start home, otherwise they are carried in the hold. Until a year or two a watchman for the crawls was not considered necessary, but so much thieving was done that the spongers were finally obliged to resort to this method of protection. Each vessel pays her share towards the watchman's expenses and wages.

Sponging vessels spend from one to two months on a trip, the state of the weather and the amount of provisions on board influencing their stay on the "grounds." The results of the trips vary quite as much as with other fishing vessels, fair winds, clear water, experience and skill, all being indispensable to success. On some trips hardly enough sponges are secured to pay expenses; on others the mens' shares amount to fair wages, and again, they will share several hundred dollars for four to six weeks' work. On an average they make rather more than almost any other class of fishermen.

The share arrangements are as follows:—On Apalachicola vessels the owners of the vessels furnish the whole outfit, pay one-third of the provision bill, and receive one-third of the net proceeds of the trip, leaving the crew to pay two-thirds of the provision bill,

and to share two-thirds of the net proceeds. When the members of the crew are not equally experienced and expert, the best men, such as the captain, cook, and the "hookers" draw whole shares and the others half or three-quarters of a share each. The captain usually receives additional remuneration from the owners. On Key West vessels the owners furnish the complete outfit, including provisions, and take one-half of the result of the trip, thus leaving a clear half to be divided equally among the crew. The captains are paid a certain commission by the owners. As an illustration of the profits sometimes made in this fishery, it may not be out of place to mention here one or two successful trips. During the winter of 1879-80, the schooner *Competitor*, of Key West, of 44 tons, carrying about eighteen men, made a trip of eight weeks, and stocked $4200. The same season, the schooner *Lone Star*, of Key West, 15 tons, carrying seven men, made a six or seven weeks' trip, and stocked $1935, and many others did quite as well. During the month of January, 1880, the spongers had unprecedented success, having brought in large loads of fine deep-water sponges, that sold for 2 dollars and more per pound for the best quality (sheepswool); before that, the average price had been $1 per pound for the first quality.

As soon as a vessel arrives in port with a catch, the sponges are carried on shore and piled on the wharf, each variety or quality by itself. At Apalachicola, where there is but one dealer, they are inspected and purchased at any time during the day that is most convenient to him, but at Key West, where there are several dealers, there are certain times for inspecting and other times for buying these lots. During the forenoon the dealers examine them carefully, and cleverly estimate their worth by eye and touch in handling them. They are so expert that they can correctly judge the weight of a bunch of sponges by lifting it, and know perfectly the value of textures by sight; it is remarkable to see the accurate judgment of several of the largest purchasers. A choice lot being offered, each party separately examines it and makes a bid, and very often a party of three or more purchasers will not vary ten pounds in a lot of several hundred pounds, and the amounts offered will not vary five dollars. As they go over the lots they place a value upon them of which they keep a record on paper. During the afternoon, when all the spongers are on shore for the day, a man sells them at auction, lot by lot, to those whose papers show the highest bids. Cash is paid at once, and the crews are not delayed in getting their shares, but are able to start off on another trip in about a week from the time of their arrival.

The principal varieties sold in these markets are called "sheepswool," "yellow" and "grass" sponges. The "sheepswool" sponge is the best quality; its texture is fine, soft, and very strong, and it sells for from $1·25 to $3 per pound, the average price being about $1·75 per pound for the best quality. The "yellow" sponge is of fine but not strong texture, and is not so soft and durable as the variety just named. It sells for 25, 30 or 40 cents per pound. The "grass" sponge is of very fine and hard texture, but is not durable, and is usually so irregular in shape that it is torn easily. It does not sell for any set price per pound, and the few that come to market are sold by the lot at a price that would not exceed 8 or 12 cents per pound. A few of the small velvet sponges are obtained and sold for a high price.

As the buyers of sponges require them to be very dry when buying by the pound, and as they are not always landed in that condition, a price per bunch is sometimes agreed upon. The bunches weigh from one-half to one pound each, and the price varies considerably, depending upon the quality, size and success in cleaning and bleaching. It is the buyer's intention to obtain a pound of sponges in this way for less than when buying by the pound. There is supposed to be a difference of about 10 cents per pound in favour of the buyer when sold by the bunch, in the case of the best qualities. Several thousand dollars were paid out weekly for sponges in 1879. Twenty-two thousand dollars cash were paid for sponges during two weeks in June of that year, and the sponge trade of Key West from January 1 to March 1, 1879, amounted to $76,500.

The dealers of both Apalachicola and Key West buy for wholesale firms of New York and receive a commission as compensation. They are kept informed of the state of the New York market, and make their bids accordingly. The packing-houses are roomy and dry buildings, where large quantities of sponges can be hung up and kept dry. As soon as a lot of them is taken in, they are put through a process called "liming," that is to say, they are dipped in a weak solution of lime and sea-water, after which they are hung up out of doors to dry. Then they are stored away in the loft until needed.

The "liming" gives the sponges a bright yellow colour, which adds to their value, but when not properly done, as by the excessive use of lime, the tissues are injured and the sponges become rotten and worthless. There is no doubt that even a little lime injures a sponge, and any considerable quantity adds greatly to its weight.

They are not "limed" at Apalachicola because the fresh water of that vicinity has a bad effect upon them; consequently it is not uncommon that quantities from that place are reshipped from New York to Key West simply to be "limed." As soon as "limed" they are laid out to dry, and they must be thoroughly dried, for if left together damp they soon become ruined. Long spells of rainy weather sometimes cause the dealer to lose thousands of dollars' worth of sponges, for they become damp, turn red, and finally decay; but now some of the dealers have lofts, or upper stories to their houses, where sponges can be hung up and kept dry in all weather. For convenience in handling the sponges are strung in bunches; otherwise such large quantities could not be managed as they are.

After this process is completed sponges are trimmed, sorted and packed. Preparatory to being trimmed, boys beat them with mallets so as to remove all particles of stone, shells, or other hard substances that would dull the shears. The trimming is done with sheep-shears, and all the uneven parts and ragged edges are cut off. After this an experienced man sorts out each variety and quality, weighing them in large crockery-crates in lots of 100 or 120 pounds each. These lots are then placed under a hydraulic press and formed into compact bales, measuring about thirty inches long, eighteen inches wide, and eighteen inches thick, which are covered with bagging and corded securely. In this form they go to the wholesale dealers of the country. The "trimmings" of the sponges are saved, and when a sufficient quantity has accumulated, are baled up in the same manner as the others, and shipped to New York to be used in upholstery work.

The sponge trade has steadily increased since it was first started, and at present constitutes a large business. During 1879 not as much was done as in 1878, because of the unusually boisterous winter, and the so-called poisonous water, which destroyed a great many sponges about the "reefs," which the reef fleet would have brought in; 1880 was also considered a poor year, as the total sales at Key West amounted to only about $180,000, while the average annual sales have been about $200,000.

The Pharmaceutical Journal.

SATURDAY, AUGUST 10, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

THE business transacted by the Council at the meeting last Wednesday was chiefly in reference to matters of detail. The meeting was attended by seventeen members, the absentees being Messrs. EVANS, GREENISH, RICHARDSON and SOUTHALL. Diplomas were granted to twenty-one persons as pharmaceutical chemists, of whom thirteen were also elected members of the Pharmaceutical Society. Two persons were elected associates in business, thirty-seven as associates and nineteen as apprentices or students. Several persons were also restored to the Society's registers. Appointments of Superintendent and Deputy Superintendent of written examinations for the ensuing year were made for thirty-nine places in the United Kingdom. On the recommendation of the Benevolent Fund Committee grants were made to four applicants for relief. The official notification of the death of Mrs. HELLOWELL, who had been an annuitant since 1881, gave opportunity for the Vice-President to draw attention to the good done by the Benevolent Fund, as testified in a letter received from the deceased's relatives expressing their gratitude to the Society for the benefit she had received. The Library, Museum, Laboratory and House Committee reported that the syllabus of the School had been revised, with the assistance of the teaching staff, and that the subject of the duties of Local Secretaries had been adjourned for further discussion. The President also informed the Council that Professor MARSHALL has consented to deliver the address in October, as stated in our issue of last week. In connection with the mention of the revised syllabus, Mr. MARTIN expressed his desire to raise a discussion of matters involved by it, and stated that he would give notice to that effect for the October meeting. At the suggestion of several members this formality was deferred for the present, so that the form of resolution to be moved might be fully digested. It was also decided that a copy of the new syllabus should be sent to each member, associate and apprentice of the Society, and that copies be sent to the Local Secretaries for distribution.

The reports of the teaching staff of the school as well as those on the prize examinations which have recently been held were as usual very satisfactory, and those relating to the Society's scholarships were of a very gratifying nature as regards the high character of the work sent in by the candidates. It would seem, as the President remarked, that these scholarships are becoming better appreciated. The fifth award of the HANBURY Medal to Professor PLANCHON, of which our readers were informed in last week's Journal, was communicated to the Council, and the selection of Professor PLANCHON for that honour was spoken of as being in complete accordance with what DANIEL HANBURY would have desired. According to an official notification addressed to the President, the tenth International Medical Congress will take place in Berlin in 1890, and the invitation addressed by von BERGMAN, VIRCHOW and WALDEYER to members of the Society as representing a branch of medicine, expressed a hope that some of them would be present on that occasion. Several members of Council were appointed delegates to the approaching meeting of the British Pharmaceutical Conference at Newcastle.

CONGRESS OF THERAPEUTISTS AND PHARMACOLOGISTS IN PARIS.

THE International Congress at Paris on subjects connected with therapeutics and pharmacology was opened last Thursday at the house of the Sociétés Savantes, under the presidency of M. MOUTARD-MARTIN, the head of the committee of organization. A large number of medical men and pharmacists were present, and among those from foreign countries were official representatives from Belgium, Holland, the United States of America, the Argentine Republic, Italy, Roumania, Chili, Brazil, Hawai, Mexico, Venezuela, San Salvador. British medicine and pharmacy were not officially represented. After an address of welcome by M. MOUTARD-MARTIN and a statement by M. DUJARDIN-BEAUMETZ as to the mode of arranging the meetings the election of a President and officers of the Congress was proceeded with, the result being that M. MOUTARD-MARTIN was elected President by acclamation, and the other members of the Provisional Committee were elected to continue their several functions. The two sections of the Congress were then constituted, the one having reference to therapeutics specially and the other to pharmacology and materia medica. A report of the principal proceedings in the latter section will be found in another column. In the section devoted to therapeutics, presided over by M. BUCQUOY, the first paper was read by M. SEMMOLA, of Naples, on "The Observation of Changes in the Blood Corpuscles as a Control in the Administration of Mercurial Preparations." According to his observations, the appearance of the blood corpuscles in regard to number and the proportion of hemoglo-

bine is always proportionate to the biological action of mercury. There is a difference only between morbid and healthy conditions. When the proportion of hemoglobine increases treatment with mercury may be continued; if it decreases the curative effect has been produced, and the mercury has begun to act as a poison. The general result of his investigation of this subject is that the method of observation suggested should be regarded as an exact measure of the utility of medicines which modify metamorphosis, because the actual therapeutic effect of that action is the augmentation of the blood globules and of the amount of hemoglobine. The other papers read at the first meeting by M. Gros on "The Action of Vesicating Substances," by M. Lavaux on "The Use of Cocaine in the Treatment of Affections of the Urinary Organs," and by M. Guelpa on "The Treatment of Diphtheria," gave rise to some discussions of a purely medical character. At the second meeting of this section papers were read by M. Crocq on "The Treatment of Pneumonia by Lead Acetate," and by M. Semmola on "The Use of Continuous Currents in Cases of Chronic Saturnism."

At the first general meeting of the Congress on Thursday, M. Dujardin-Beaumetz read his report on antithermic analgesic medicines, one of the subjects that had been selected by the organizing committee with the object of calling attention to the therapeutic effects of the several substances belonging to that class of medicines, and promoting their comparative study from that point of view. In the course of this report it was shown that the experience already gained is sufficient to demonstrate that these different medicines are for the most part not only analgesics but also antithermics, while several of them are antiseptics. Some of them act as antiferments, other act upon the blood globules and lower the temperature of the body by diminishing the respiratory action, while others again influence the calorigenic centres of the nervous system by acting directly upon the cerebro-spinal centres. These latter antithermics possess almost exclusively analgesic properties. The relation existing between the physiological properties of these substances and their molecular constitution is another point to which reference was made as being one of great importance to investigate. The general result of the work carried out by the author in conjunction with M. Bardet on this subject was described as pointing to the establishment of certain rules for estimating provisionally the physiological effects that a compound will produce. In the case of compounds derived from the aromatic series antiseptic properties belong especially to the hydrated derivatives, such as the phenol, naphthols, etc. Antithermic properties preponderate in the amido derivatives—acetanilide, kairine, thalline; lastly analgesic properties are met with, especially in those amido derivatives which contain a molecule of some alcohol radicle, particularly methyl, substituted in the place of an atom of hydrogen, as in dimethyoxyquinizine acetphenetidine and methylacetanilide.

The reading of this report gave rise to a discussion in which considerable difference of opinion was expressed as to the value of the new medicinal agents in question. M. Lepine, of Lyons, drew attention to the fact first made known by himself that antipyrin has the power of allaying pain, and that acetanilide has the same effect, facts which lead to the idea that all antipyretics may really have an action upon the nervous system. This view of the subject, suggested in some degree by Laborde's researches on the analgesic action of quinine, has been confirmed by that observer, and also by Dujardin-Beaumetz. But this action of antipyrine and the other antithermics upon the nervous system is not only analgesic. One result of Lepine's investigations is that under the influence of those agents the consumption of glucose in the capillaries is diminished; that there is a diminution in the formation of glucose at the expense of glycogen in the liver and the muscles, which may even be determined in some instances. Then since the action of these substances upon the consumption of albumenoids being in all cases unimportant from the point of view of heat production, it would follow that it is to the diminution in the consumption of hydrocarbons in the body that must be attributed most part of the lowering of temperature which those substances produce so readily in the lower animals. M. Lepine considers that the substances in question are protoplasmic poisons, but much less active than quinine. Their essential character is to exercise a dynamic influence upon the nervous system modifying at the same time the sensitive impressions and the production of heat by restricting the consumption of hydrocarbon material, and in his opinion the application to them of the term analgesics gives a very incomplete idea of their mode of action. Some of the other speakers on the subject objected to the use of antipyrin and similar substances, not only by reason of their having often failed to recognize any beneficial effects, but also because their use is frequently attended with the inconvenience of a consequently prolonged convalescence, but with the exception of the salient points above mentioned the discussion was almost entirely medical. In the course of M. Bardet's remarks mention was made of a preparation met with in England under the name of exalgine, which is really aceto-toluidine, having properties essentially different from those of methylacetanilide. At the conclusion of the discussion upon M. Dujardin-Beaumetz's report a paper was read by M. Assaky, giving an account of the observations made by him on the use of diiodosalicylic acid as a remedy in rheumatic affections. That substance was found

to be much more efficacious than salicylate of soda and much more to be relied upon for certainty of action. It appears also to possess very marked antiseptic properties.

The second report on selected subjects was that by M. Bucquoy on "Heart Tonics." It dealt with the numerous substitutes for digitalis that have been introduced within the last few years, convallaria, adonis venalis, squill and especially strophanthus, pointing out the necessity of ascertaining the active principles to which the action of these drugs is due, and whether the effects produced by them are the same as those of the drugs in their natural state. Other heart tonics, such as antiaris toxifera, black hellebore, erythrophlæum guinense, and nerium oleander were not considered to have been sufficiently adopted in medical practice to deserve notice. The discussion of this report was entirely medical.

The third report on antiseptics specially applicable for particular pathogenic microbes, by M. Constantin Paul, showed that though parasiticide medication presented numerous instances of practical applicability, the different substances employed for that purpose have not always the same action upon individual microbes. The reporter also gave an account of the results he had obtained with different antiseptic agents upon the microbes of putrefaction, of typhoid fever, cholera and tuberculosis. He also described the influence of temperature upon these different micro-organisms. In connection with this report, M. Semmola read a paper on "The Use of Sulphur as an Antiseptic in Medicine and Surgery," and described the successful result he had obtained with it in the treatment of typhoid fever and gastric catarrh. He also found that sulphur has a powerful sterilizing effect, and recommends the use of the powder for dusting the clothes of fever patients as well as an external application in surgical cases.

PROSECUTIONS UNDER THE PHARMACY ACT.

An Aberdeenshire paper in commenting upon the prosecutions under the Pharmacy Act reported at page 119 remarks that these convictions raise questions of considerable public interest, as the regulation of the sale of poisons is a matter of great importance. But it is held that since the law on this subject has evidently been sleeping so far as many country districts are concerned, it is right and proper that being now roused into activity it should be enforced leniently, as in all probability the persons selling poisons without being possessed of the necessary legal qualification had no intention of infringing the law. This is an opinion, the expression of which may fairly be attributed to local sympathy with the persons prosecuted; but it may also be considered that the prosecutions will have been not only useful in the public interest, but likewise as answering the purpose of a warning against the risks incurred by the unlawful sale of poisons. However the writer of the article referred to, while admitting that so long as the law remains as it is it must be enforced, suggests that it is a fair matter for consideration whether the law might not advantageously be amended. The reason assigned for this suggestion is that in one of the cases, which is considered to be probably a typical one, the shop of the person prosecuted for illegally selling poisons was six miles distant from any qualified druggist's shop, and therefore it is thought to be not at all surprising that a general dealer should in such a case seek to add to his stock in trade a supply of drugs. This suggestion involves a shifting of the question from poisons to drugs, and the difference between the two cases is important. No doubt many general dealers in remote districts do add drugs to their stock in trade, and though the practice may be in some respects a convenience, it is not without its serious drawbacks. Even the dealing in drugs and medicines, sometimes of a potent character, requires a greater amount of special technical knowledge than general dealers possess, and there have been cases in which serious mischief has resulted from the sale of what are regarded as simple drugs and medicines by unqualified persons. As regards actual poisons, and especially those which are included in the schedule of the Pharmacy Act, the case is very different. There does not appear to be in regard to them any ground for apprehending that country people would be subjected to great hardships if on account of the requirements instituted for the general public interest they were under the necessity of going six miles, or even further, to obtain such poisons as they need from a duly qualified vendor of them. The article purchased in the case referred to was corrosive sublimate, a most dangerous poison, and we cannot imagine any circumstances under which the need for this article could not have been amply satisfied even if it had to be obtained from a considerable distance. The writer of the article admits that even in the most sequestered rural districts the public safety demands that poisons should only be handled by qualified men, but it is at the same time suggested that it might possibly be an advantage to make special arrangements for such places by having a lower grade of qualification than that which now exists. We cannot concur with that view, for it is precisely under such conditions that there is the greatest risk of mischief résulting from the improper use of poisons and from mistakes in their sale. The great number of fatal accidents that occur with carbolic acid, a poison that is not subject to the restrictions of the Pharmacy Act, ought alone to be sufficient evidence that if any change be needed in the law it should be rather in the direction of augmenting those restrictions than decreasing them. In its general tenor the article we have referred to recognises the propriety of confining the trade in poisons and drugs or medicines to properly qualified persons by reason of the need for due technical knowledge of that business, and we think it cannot fail to be seen that any want of facilities for obtaining supplies of such articles is due rather to the fact that the persons needing them reside in sparsely populated rural districts than to any oppressive administration of the law relating to the sale of poisons.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, August 7, 1889.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Gostling, Hampson, Harrison, Hills, Leigh, Martin, Martindale, Newsholme, Robbins, Schacht and Watt.

The minutes of the previous meeting were read and confirmed.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Brown, James Joseph.
Church, Edward Harry.
Cox, Herbert Victor.
Davison, Daniel.
Fuge, Harry Dixon.
Fuller, George Sydney.
Grice, Joseph Edward Brindley.
Harper, Edmund William.
Hobbs, Alfred Ernest.
Jones, John.
Latchmore, Alfred.
Livesley, Thomas Henry.
Norman, Richard Henry.
Robertson, William George.
Routley, Edwin Walter.
Smith, Albert.
Smith, Frederick.
Sturton, John Gilbert.
Thornley, John Brooks.
Wain, Clement John.
Young, Edward Francis.

Elections.

MEMBERS.

Pharmaceutical Chemists.

The following having passed the Major examination, and tendered their subscriptions for the current year, were elected "Members" of the Society:—

Church, Edward Harry.....Cambridge.
Cox, Herbert Victor .....Southampton.
Davison, Daniel .....Snaresbrook.
Grice, Joseph Ed. Brindley ...London.
Harper, Edmund William.....Rotherham.
Heap, Isaac Henry .....Stoke-on-Trent.
Hobbs, Alfred Ernest.....Tunbridge Wells.
Latchmore, Alfred .....Luton.
Livesley, Thomas Henry .....New Mills.
Norman, Richard Henry .....Cottenham.
Routley, Edwin Walter.....Bath.
Smith, Albert .....Royston.
Stead, John Christopher ..... London.
Surfleet, Arthur George.....Gainsborough.
Thornley, John Brooks .....London.
Wain, Clement John .....Tunstall.

ASSOCIATES IN BUSINESS.

The following having passed the Minor examination, being in business on their own account, and having tendered their subscriptions for the current year, were elected "Associates in Business" of the Society:—

Dryden, Thomas .....Landore.
Heywood, William .....Heywood.

ASSOCIATES.

The following, having passed the Minor examination, and tendered (or paid as "Apprentices or Students") their subscriptions for the current year, were elected "Associates" of the Society:—

Arrandale, James William.....Denton.
Ashton, Thomas Richard .....Manchester.
Bate, Arthur Macaulay .....Northampton.
Broadbent, Harry Ralph .....Manchester.
Bushby, Arthur ....Manchester.
Chappelow, Thomas Henry ...Southampton.
Davies, Daniel Evan .....Carmarthen.
Donellan, Arthur W. Ernest...Crewe.
Elmitt, William .....Lincoln.
Farthing, George Thompson...Spennymoor.
Findlay, John ....Edinburgh.
Gibson, William Thomas .....Collingham.
Harries, Howell .....St. Clears.
Hepple, Thomas .....North Shields.
Hewitt, Joseph Frederick.....York.
Hughes, Thomas Edward .....Newtown.
Hurd, William .....Nottingham.
Jacks, Frederick.....Longton.
Jacques, Sidney Paul.....London.
Jeffcoat, Joseph George.....London.
Judd, Walter Rossell.....Liverpool.
Lawrenson, John .....Radcliffe.
London, Walter Augustus.....Redditch.
Marsden, Prosper Henry .....Manchester.
Morton, Lawrence Knyvett ...Kennington.
Parsons, Henry Imber .....Barnstaple.
Perks, Alfred .....Birmingham.
Price, Walter William .....Worcester.
Rhodes, Alfred Barrett .....Manchester.
Rodgers, Ivo Fredk. Joseph ...Stafford.
Roe, George ....London.
Smales, Alfred John .....Darlington.
Talintyre, William John .....Stockton-on-Tees.
Taubman, Frank Mowbray ...London.
Watkinson, William Harrison...Farnworth.
Westlake, George Frederick...London.
Wyatt, Alvan Lovell .....Stourbridge.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination, and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Armitage, Nathaniel Newborn.Armley.
Ball, William Titus.....Swansea.
Burn, James Robert .....Newcastle-on-Tyne.
Carpenter, Albert Hemsley ...London.
Cole, Beatrice .....London.
Dixon, John William.....Milnthorpe.
Evans, Rees .....Llanybyther.
Flood, Fanny .....London.
Hill, Richard Barker .....Howden.
Hole, John Beeston.....Mansfield.
Knight, George Thomas.....Halesowen.
Le Cudennec, Louis Edouard...Mauritius.
Mundell, Stephen .....Leeds.
Pattison, Herbert George .....Shrewsbury.
Seymour, William Herbert ...London.
Simpson, Herbert .....West Hartlepool.
Spencer, Robert Shenstone ...London.
Waddington, Joseph Edwd. G..Manchester.
Wynn, Herbert Alfred .....Melton Mowbray.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

Superintendents of Written Examinations.

The following gentlemen were appointed Superintendents and Deputy-Superintendents of written examinations for the ensuing year:—

Superintendents.

Aberdeen .....Strachan, Alexander.
Birmingham .....Southall, Alfred.
Brighton .....Gwatkin, James Ross.
Bristol .....Stroud, John.
Cambridge .....Deck, Arthur.
Canterbury .....Bing, Edwin.
Cardiff .....Munday, John.
Carlisle .....Thompson, Andrew.
Carmarthen .....Lloyd, Walter.
Carnarvon .....Jones, John.
Cheltenham .....Barron, William.
Darlington .....Robinson, James.
Douglas, Isle of Man ...Brearey, Arthur William.
Dundee .....Hardie, James.
Edinburgh .....Stephenson, John B.
Exeter .....Broom, William Willey.
Glasgow .....Kinninmont, Alexander.
Guernsey .....Nickolls, John Bate.
Hull .....Bell, Charles Bains.
Inverness .....Allan, Alexander.
Jersey .....Ereaut, John.
Lancaster .....Vince, James.
Leeds .....Reynolds, Richard
Lincoln .....Maltby, Joseph.
Liverpool .....Parkinson, Richard.
London .....Taylor, George Spratt.
Manchester .....Benger, F. Baden.
Newcastle-on-Tyne.....Martin, Nicholas Henry.
Northampton .....Bingley, John.
Norwich .....Sutton, Francis.
Nottingham .....Parker, William Henry.
Oxford .....Prior, George Thomas.
Peterborough .....Heanley, Marshall.
Sheffield .....Ward, William.
Shrewsbury .....Cross, William Gowen.
Southampton .....Dawson, Oliver Robert.
Truro .....Percy, Thomas Bickle.
Worcester .....Virgo, Charles.
York .....Sowray, Joseph.

Deputy-Superintendents.

Aberdeen .....Reid, William.
Birmingham.....Churchill, Walter John.
Brighton .....Savage, William Wallace.
Bristol .....Pitman, John.
Cambridge .....King, George.
Canterbury .....Amos, Daniel.
Cardiff .....Coleman, Alfred.
Carlisle .....Hallaway, John.
Carmarthen .....Williams, Joshua Edward.
Carnarvon.....Jones, David.
Cheltenham .....Fletcher, John.
Darlington .....Hutchinson, Rev. E.
Douglas, Isle of Man ...Davis, William Richard.
Dundee .....Hardie, James Miller.
Edinburgh .....Ainslie, William.
Exeter .....Harris, Henry William.
Glasgow .....Davison, Thomas.
Guernsey .....Cumber, Charles Davis.
Hull .....Stoakes, Benjamin M.
Inverness .....Ogston, William.
Jersey .....Ereaut, George.
Lancaster .....Arkle, William.
Leeds.....Smeeton, William.
Lincoln .....Battle, John Scoley.
Liverpool .....Hocken, Joshua.
London ..... { Allen, Charles Bowen. / Moon, Harry.
Manchester .....Midgley, Charles.
Newcastle-on-Tyne .....Wright, Alfred.
Northampton .....Mayger, William D.
Norwich .....Corder, Octavius.
Nottingham .....Patchitt, Edwin Cheshire.
Oxford .....Thurland, Henry.
Peterborough .....Saunders, James Edwin.
Sheffield .....Newsholme, G. T. W.
Shrewsbury .....Blunt, Thomas Porter.
Southampton .....Spearing, James.
Truro .....Anstey, John Upham.
Worcester .....George, Henry.
York .....Wilson, Thomas William.

Reports of Committees.

FINANCE.

The report of this Committee was of the usual character, recommending sundry accounts for payment.

The PRESIDENT moved the adoption of the report and recommendations, which was unanimously agreed to.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (aged 53) of a registered chemist and druggist and former annuitant. In bad health, and without friends. Applicant has had eight previous grants of like amount. (Norfolk.)

£10 to the widow (aged 59) of a member for forty-one years and subscriber to the Fund for seven years. Applicant has had one previous grant; she suffers from asthma and is not able to do anything. (Hants.)

£10 to a registered chemist and druggist (aged 63) in very bad health, and without any means. Applicant has had one previous grant of £10. (Somerset.)

£10 to a former associate (aged 41), in bad health, which has led to his losing his employment; the grant is made to assist him to emigrate. (Sussex.)

One case was deferred for further inquiries, and three the Committee declined to entertain.

Death of an Annuitant.

The SECRETARY reported the death of Mary Anne Hellowell, aged 79, who had been an annuitant since 1881.

The VICE-PRESIDENT moved the adoption of the report and recommendations, and in doing so read a letter from a subscriber, conveying the intelligence of the death of Mrs. Hellowell; in which he expressed his own grateful thanks and those of the deceased's relatives for the benefits she had derived from the Benevolent Fund. The annuity had been a great blessing to her, and had made her last years much more comfortable than they could have been otherwise. The Vice-President added that it was always a satisfaction to find that the good which the Benevolent Fund was the means of doing throughout the country was appreciated.

The resolution was carried unanimously.

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
June	Day . .	536	32	11	22
	Evening .	192	17	5	10

Circulation of books.	Town.	Country.	Total.	Carriage paid.
June. . . .	170	110	280	£1 4 6½

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

For the Library in London—

Edinburgh University Calendar, 1889.
From the UNIVERSITY.

Wilbuschewicz (E.), Histologische und chemische Untersuchungen der gelben und rothen amerikanischen und einiger cultivirter Java-Chinarin-

den der Sammlung des Dorpater pharmaceutischen Institutes, 1889.
From PROFESSOR DRAGENDORFF.

Attfield (J.), Chemistry, 13th ed., 1889.
From the AUTHOR.

Radcliffe Library, Oxford, Catalogue of books added during 1888.
From the RADCLIFFE TRUSTEES.

Manchester Microscopical Society, Transactions and Annual Report, 1888. From the SOCIETY.

Acta horti petropolitani, tom. 10, fasc. 2.
From the IMPERIAL BOTANIC GARDEN.

Imperial University, Japan, Mitteilungen aus der medicinischen Facultät, Bd. 1, No. 3.
From the UNIVERSITY.

The Committee recommended the purchase of the undermentioned works:—

For the Library in London—

Dujardin-Beaumetz and Yvon, Formulaire, 2e éd.
Attfield, Chemistry, 13th ed.
Remsen, Inorganic Chemistry, 1889.
Boulger, Uses of Plants, 1889.

The Committee authorized the Librarian to attend the annual meeting of the Library Association in London, in September.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
June	Morning	605	38	10	25
	Evening	117	13	2	4

The following donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimens of the seeds of *Strophanthus glaber*, False Cola Nuts, and Pichi.
From Messrs. T. CHRISTY and Co.

Specimens of the native shears at Agra used for cutting betel nut and three carvings in betel nut; Cobalt ore, Chrome Iron ore, Nickel ore (silicate), and Kauri gum from New Caledonia; three specimens of native Sulphur from New Zealand; a specimen of Pituri and three pamphlets relating to it.
From Mr. H. B. BRADY, F.R.S.

Specimens of the roots of *Aconitum Napellus* collected during December, January, February, March and April; and five microscopic slides of Aconite root. From Mr. P. W. SQUIRE.

Specimens of the Fruits of *Cochlospermum Gossypium*, Scinde Gum, the gums of *Adansonia digitata*, *Albizzia procera* and *Acacia farnesiana*; compound galls on the branches of the teak tree; barks of *Boswellia Bhau-Dajiana*, *Sterculia urens*, *Spatholobus Roxburghii* and *Albizzia procera*, with the gum attached to it, and of *Anacardium Occidentale* with the gum of the tree.
From Mr. J. G. PREBBLE (Messrs. Kemp and Co.), Bombay.

To the Herbarium.

Twenty-seven specimens of Medicinal Plants.
From Mr. J. G. PREBBLE, Bombay.

A series of native Medicinal Plants.
From Dr. J. FARRELL EASMON, Gold Coast.

Specimen of *Rhamnus oleifolius*.
From Messrs. SCHŒLLKOPF, HARTFORD and MACLAGAN.

The Committee had ordered that the Library and Museum in London and Edinburgh be closed in the evenings during August and September, that the Library and Museum in London be closed entirely during the first fortnight in September, and the Library and Museum in Edinburgh from August 19 to September 3rd, both dates inclusive.

The staff of the Society's School had attended the Committee and reported on their respective classes.

The Sessional Address.

The PRESIDENT had reported that he had invited Professor John Marshall, President of the Medical Council, to deliver the inaugural Sessional Address in October next.

School of Pharmacy.

The syllabus of the School had been revised with the assistance of the staff, and the Committee had recommended that a copy be sent to each member, associate in business, and apprentice of the Society. The question of the duties of Local Secretaries had been considered and was adjourned for further discussion.

The PRESIDENT, in moving the adoption of the report, said the subject of Local Secretaries had been considered at some length, and the members of the Committee were gradually getting to understand each other's minds, but it was thought desirable that the matter should be still further considered, and all possible assistance obtained from their friends in the country before a definite report was presented. He was very glad to be able to announce that Professor Marshall had consented to give the address in October. He was the President of the Medical Council, and a distinguished surgeon, associated with art as well as science, and was deeply sympathetic with the Pharmaceutical Society.

Mr. MARTIN said he presumed the adoption of the resolution would carry with it the approval of the syllabus of the School, as to which he wished to make some remarks, the purport of which he had mentioned on the previous evening at the General Purposes Committee meeting. He was quite prepared to make his remarks now, or if it were thought more convenient, to postpone them, and give a notice of motion for October, when perhaps the members of Council would have been able to think over the matter, and be better prepared to discuss and elucidate what was perhaps a somewhat difficult subject.

Mr. CROSS suggested that Mr. Martin should postpone his observations until October. The questions he had raised in the Committee required careful consideration, and it would be much better for members to have the opportunity of reading a carefully prepared notice of motion.

Mr. HAMPSON hoped the tenour of the resolution submitted by Mr. Martin would ask the Council to place the consideration of the matter in the hands of the Committee, because it involved a great many technical details.

Mr. MARTIN said he was prepared to give the notice now; he thought perhaps it would be well to have it published at once so that members might have full time to consider it.

The PRESIDENT suggested it would be as well not to hurry it. One week's notice was all that was really required.

Mr. HARRISON said Mr. Martin had already drawn attention to the matter, and most of the members knew generally what his views were; but as to the precise form of the resolution, if he would take his advice he would wait, and only give the ordinary legal notice, in order to give himself full time to see that it was worded exactly as he would like.

The motion was then put and agreed to.

It was also arranged on the suggestion of the President that copies of the syllabus be supplied to the Local Secretaries for distribution.

GENERAL PURPOSES.

The report of this Committee included the reports on the Prize Examinations, and the motto envelopes had been opened to ascertain the names of the successful competitors.

Practical Chemistry.

Professor Attfield had reported on the attendance and work of his class, the general conduct of which during the session had been satisfactory. Sixteen students had competed in this examination.

Chemistry.

Professor Dunstan had reported that the attendance and work of the students during the session had been uniformly good, and referred to the satisfactory working of the new school course. Sixteen students had presented themselves at the competition for the silver medal.

Botany.

Professor Green had reported on the Prize Competition in his class. Three papers had been set, each occupying three hours, the last paper being in practical work, and the candidates had sent in very satisfactory papers.

Materia Medica.

Mr. Holmes had reported that eight students had competed for the silver medal, and that the papers produced were extremely good.

Pharmacy and Practical Pharmacy.

Mr. Ince had reported on the examination of this class, at which eight students had competed, one of whom had succeeded in obtaining nearly full marks.

Herbarium Prize.

Professor Green had reported on the three collections sent in for this prize, and had recommended each of them for recognition by the Council.

Council Prizes.

A report on the competition for these prizes had been received from Messrs. Blunt and Bowen.

Acting on the above reports the Committee recommended that the following prize awards be made :—

Practical Chemistry.

Silver Medal.....Harry Dixon Fuge.

Certificates of Honour...
- John Brooks Thornley.
- Richard Henry Norman.
- George Sydney Fuller.

Chemistry and Chemical Physics.

Silver Medal.....John Brooks Thornley.

Certificates of Honour...
- Harry Dixon Fuge.
- Richard Henry Norman.
- Lewis Ough.

Botany.

Silver Medal.....Harry Dixon Fuge.

Certificates of Honour...
- Lewis Ough.
- Alfred Latchmore.
- William Thomas Jones.

Materia Medica.

Silver Medal.....Clement John Wain.

Pharmacy and Practical Pharmacy.

Silver Medal..... ..Richard Henry Norman.

Herbarium Prize.

Silver Medal ....Wm. Foskett E. Horrell.
Bronze Medal ....George James Monger.
Certificate of Honour ..... Alfred Wade Willmott.

Council Examination Prizes.

Pereira Medal (Silver); and Books value £5, presented by Mr. T. H. Hills.

Harry Dixon Fuge.

Pharmaceutical Society's Medal (Silver); and books value £3, presented by Mr. T. H. Hills.

Alfred Mander.

Pharmaceutical Society's Medal (Bronze); and books value £2, presented by Mr. T. H. Hills.

Lewis Ough.

Solicitor's Report.

The report of this Committee also included the usual letter from the solicitor reporting on the progress of cases which had been placed in his hands. Several defendants had paid penalties and costs prior to the hearing, and in two cases judgment had been obtained for two penalties and costs on the higher scale.

Several cases had been considered by the Committee, in some of which proceedings had been recommended. A report had also been received from the Assistant-Secretary in Edinburgh, stating that the proceedings which had recently been instituted against seven offenders in Aberdeenshire had all been successful.

The Council, as usual, went into committee to consider this portion of the report.

On resuming, the report and recommendations were unanimously adopted.

HERBARIUM PRIZE.

Mr. MARTIN, referring to the Herbarium competition, said it was very gratifying to find that three collections had been sent in, all of which Professor Green considered worthy of commendation, and he hoped this would be an encouragement to young students to collect and send in specimens. It was very satisfactory to find that the award was made on a reasonable number of specimens. It had sometimes happened that the medal had been obtained by a man who had plenty of time at command, and enough money to travel about to different parts of the country and obtain specimens. If the students who took an interest in botany throughout the country would take notice that the Professor had awarded the prize not necessarily to the largest collection, but on the quality of the work done, and would take courage and send up the best collections they could make in their immediate neighbourhood, it would be a great advantage. It would be much better if the award were made on twenty collections every year instead of three.

JACOB BELL MEMORIAL SCHOLARSHIPS AND REDWOOD SCHOLARSHIP.

The Committee appointed to make the award of the Jacob Bell Memorial and Redwood Scholarships for the ensuing session, subject to the approval of the Council, reported that thirty-one candidates had presented themselves at the following centres :—Brighton, 1; Bristol, 1; Cambridge, 1; Canterbury, 2; Cardiff, 1; Exeter, 1; Lancaster, 1 ; Lincoln, 1; Liverpool, 3; London, 11; Manchester, 2; Norwich, 2; Nottingham, 1; Southampton, 1; Truro, 1; and Worcester, 1. The envelopes bearing the mottoes of the successful candidates had been opened by the Committee and found to contain the following names:—

1. Charles Ernest Boucher.....Bristol.
2. Harry William Kilby Pears ...Brighton.
3. Edward Birchall Sherlock.....Liverpool.

The Committee had therefore awarded the Jacob Bell Memorial Scholarships to

Charles Ernest Boucher
and
Harry William Kilby Pears,

and the Redwood Scholarship to

Edward Birchall Sherlock.

The PRESIDENT said it was very gratifying to find that a number of the candidates had obtained sufficient marks to entitle them to the scholarships; in fact ten of the competitors had obtained marks qualifying for

the Bell Scholarships, and eighteen had obtained the standard for the Redwood Scholarship. Whether it was accidental or whether these scholarships were becoming more appreciated he did not know, but it was undeniable that the work sent in was far above the average.

Mr. MARTIN hoped some wealthy pharmacists would take the hint and endow further scholarships.

The report and recommendations of the Committee were received and adopted.

Votes of thanks were passed to Professor Green for his report on the Herbarium competition; to Messrs. Tanner and Saul for their report on the Jacob Bell Memorial and Redwood Scholarships; and to Messrs. Blunt and Bowen for their report on the Council Prize Examinations.

THE HANBURY MEDAL.

A report had been received from the Adjudicators appointed under the provisions of the deed of settlement for the Hanbury Medal, awarding the gold medal to

Professor Gustave Planchon, M.D., D.Sc.,

for his researches into the natural history and chemistry of drugs. The award had been made by the President of the Chemical Society, the President of the Linnean Society, the Presidents of the Pharmaceutical Society and of the British Pharmaceutical Conference, and by Mr. Charles Ekin, a Pharmaceutical Chemist nominated an adjudicator in accordance with the deed of settlement by the Presidents of the Pharmaceutical Society and of the British Pharmaceutical Conference.

The PRESIDENT said most members were aware that Professor Planchon was the successor of Guibourt, the French Hanbury of materia medica. He had edited several editions of Guibourt's well-known work, and was also the author of a work on the determination of the purity and quality of drugs of vegetable origin, in two volumes, a work on barks, and a series of articles on the cinchonas, ipecacuanhas, and other drugs of that kind. In every way he appeared to be just the sort of man whom Daniel Hanbury would have wished to honour, and it was perhaps expressly appropriate that this year the medal should go to a distinguished Frenchman.

Mr. MARTINDALE said he had been pleased to make Professor Planchon's acquaintance the other day at the Paris Congress on Materia Medica and Therapeutics, of which he was one of the Secretaries. He felt quite satisfied that Professor Planchon was a worthy recipient of the medal.

The PRESIDENT moved the adoption of the report, which was unanimously agreed to.

REPORT OF EXAMINATIONS.

July, 1889.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (9th)	8	5	3
,, (10th)	7	3	4
,, (17th)	8	6	2
,, (18th)	7	5	2
	—30	—19	—11
Minor (9th)	20	7	13
,, (10th)	25	11	14
,, (11th)	30	10	20
,, (12th)	28	9	19
,, (17th)	25	11	14
,, (18th)	25	13	12
,, (19th)	28	12	16
	—181	—73	—108
	211	92	119

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major (17th)	3	2	1
Minor (17th)	11	7	4
,, (18th)	13	8	5
,, (23rd)	13	3	10
,, (24th)	12	5	7
	—49	—23	—26
	52	25	27

Preliminary Examination.

	Candidates Examined.	Passed.	Failed.
(9th)	357	158	199.

Two certificates received in lieu of the Society's examination.

INTERNATIONAL MEDICAL CONGRESS.

The PRESIDENT said he had received an official notification inviting him to announce that the tenth International Medical Congress would take place in Berlin in 1890, when it was hoped that some members of the Society would be present. The invitation was signed by three distinguished men, Von Bergmann, Virchow, and Waldeyer, and was sent to the Society as representative of one branch of medicine.

THE BRITISH PHARMACEUTICAL CONFERENCE.

The President, Vice-President, Treasurer, and Messrs. Allen, Atkins, Cross, Gostling, Leigh, Martindale, Newsholme, Schacht, and Watt, were appointed delegates to the Conference, and the Editor, Sub-Editor and Secretary were also requested to attend.

SEPTEMBER COUNCIL MEETING.

The PRESIDENT stated that the Members of Council would receive, in the usual course, notice for a meeting in September, but it was understood that a quorum would not be formed, and he would ask his colleagues therefore to regard the notices as merely formal.

The Congress of Therapeutists and Pharmacologists at Paris.

SECTION OF PHARMACOLOGY.

The section devoted to pharmacology, after an hour and a half devoted to preliminary matters, commenced on Thursday at half past ten, M. Delpech occupying the chair.

The first paper, entitled "General Remarks upon Tar and its Preparations, and the Means of Rendering Tar Soluble," was read by M. Verne, of Grenoble. His process consists in making a tar soap with hydrate of sodium, drying it and dissolving it in definite proportions in water. In the discussion that followed it was objected that the preparation recommended by M. Verne was a compound of tar rather than a simple solution. M. Verne maintained, however, that it contained in a soluble form the whole of the constituents of tar, the liquids insoluble in water being suspended in the form of an emulsion when the soap is much diluted, the soap itself being soluble in 2 or 3 parts of distilled water.

Then followed a paper by M. Casthélar, of Paris, on "The Preparation of Iodoform by the Use of Acetone." By the method recommended by him iodoform can be prepared directly from the alkaline iodides of sodium and potassium obtained in the kelp manufacture. The solution of these salts after being deprived of sulphur by the ordinary methods in use, on the addition of caustic soda, acetone and hypochlorite of sodium, gives an immediate yellowish white milky precipitate

of iodoform. This is deposited as a fine powder, but can be obtained in fine micaceous crystals by recrystallization from toluol or other suitable solvent.

Three other papers, viz., one by M. Freyssinge, of Paris, on the acid or alkaline solutions of tar, a second by M. Causse, of Orleans, on (a) "The Preparation of White Balsam of Tolu"; (b) on "The Double Iodides of Mercury and the Alkaloids," and a third by M. Jolly on "Iodine Considered as a Therapeutic Agent in Diseases Dependent on Infection by Microbes," were taken as read, the authors not being present. M. Jolly recommends the use of iodine because in the proportion of 1 in 4000 it is a powerful antiseptic. It forms insoluble precipitates with alkaloids and would thus prevent the toxic effects of ptomaines and leucomaines, whilst its easy diffusibility is also a great advantage. The preparations recommended by M. Jolly are a wine of iodine and iodine associated with a solution of phospho-glycerate of potassium. In the form of pills he finds that extract of walnut prevents iodine from causing irritation of the stomach.

On Thursday the members of the Congress received an invitation to spend the evening in a social entertainment at the house of M. Dujardin-Beaumetz. About a hundred members attended, and a very enjoyable evening was spent.

On Friday morning, at nine o'clock, Dr. G. Planchon occupying the chair, the session was continued, the first paper being read by Dr. Balme, of Grenoble "On Antiseptic Paper for Producing Instantaneous Solution of Perchloride of Mercury." His method consists in taking a solution of known strength and dropping a quantity on paper, perforated like postage stamps, a definite amount being dropped on each square so that one square of paper dropped into fifty grams of water would give 50 grams of solution of a strength equal to the *Liqueur de van Sivieten*. The paper used in the process is specially prepared, being treated successively with hydrochloric acid and dilute hydrofluoric acid, then with potassic carbonate, and finally with chloride of sodium to form a double soluble salt with the perchloride of mercury. For regulating the amount of solution dropped on each square of paper and keeping it uniform during drying special apparatus is used, for explaining which in detail an opportunity may occur later on.

The next paper was by M. Godin, "On Fumigating Porolithes for Antiseptic Purposes." This process consists in the use of a porous stone for portability in carrying liquid antiseptics and for regularity in distributing the vapour gradually when the porolithes are heated. The solution used is made by decomposing a mixture of iodide and iodate of potassium with tartaric acid, or vinegar. The exact nature of the stone used was not described beyond the name "Porolith fluorhydrique." The size of the stone used by the author is about 6 centimetres long 3 broad and 1 in thickness and it weighs about 25 grams. The stone when it has been used to absorb a volatile or corrosive acid, such as dilute hydrofluoric acid, of which it will hold 10 grams, is wrapped in paraffin paper and then in tinfoil. He also uses the porolith for the distribution of the vapour of creosote, eucalyptol and a mixture of thymol and phenol.

The next paper was by M. Jouisse (Orleans) "On Antiseptics Applied in the Form of Plaister."

M. Jacquemaine, of Villafranche (Rhône), "On the Sterilization by Means of Carbonic Acid of Various Medicinal Liquids." He exhibited specimens of monocalcic phosphate, and the same in association with pepsin kept in solution by means of carbonic acid gas. He stated that the usual deposition of a bibasic phosphate is prevented, the liquid remaining perfectly clear, while the development of the microphyte *Hygrocrocis phosphaticus* is hindered. The solution used, however, appears to be a biphosphate and hydrochlorophosphate of calcium, and the solution, although perfectly limpid, had a somewhat disagreeably acid taste. The pepsin preparation has the disadvantage of frothing too freely.

M. Rennès paper on "A Method of Utilizing without Danger Fluorides and Iodine in the Treatment of Contagious and Infectious Diseases," contained a formula for a preparation in which fluoride of ammonium formed an ingredient. The formula given was as follows:—

1. ℞ Ammonium fluoride	25	grams.
Iodine	30	,,
Distilled water of *Eucalyptus globulus*	80	,,
Shake together.		
2. ℞ Essential oil of canella	4	,,
,, ,, cloves	1	
Alcohol (rect.)	35	,,
Glycerine	25	,,
Syrup of Gatinais honey . . .	300	,,
	500	

Mix these liquids successively, shake for ten minutes. Mix the two liquors, shake strongly and filter. Honey is used in preference to sugar because the latter contains traces of lime, which would lessen the germicidal action of fluoride of ammonium. The author has satisfied himself that this mixture is borne by the stomach. It is given in ʒj, ʒij, or 4 drachm doses.

On Saturday morning at 9 o'clock, M. Adrian being in the chair, the first paper called was by M. Miesch, on "A Form of Tampon for use like a Medicated Pessary," but it was of a character fitted rather for a chirurgical than a pharmaceutical audience and the exact nature of the material used for the tampon was not divulged. Indeed there seems to have been some difficulty in allotting this paper to the two sections of pharmacology or therapeutics.

The next paper was by G. M. Velpry (Reims), "On Granulated Products and on a Form of Saccharohydrometer."

The next paper, by M. Gareau, (Le Mans) referred (*a*) to an improvement in the preparation of the "looch blanc" of the Codex. This consists chiefly in using a certain proportion of gum arabic instead of tragacanth, and (*b*) to a process for the preparation of tinctures dependent on the fact that in macerating solids in liquids the portion first saturated is heavier than the rest of the liquid. It has already been published in the *Union Pharmaceutique* for 1887.

This was followed by a paper on the possibility of preparing a mercurial ointment, containing 80 to 90 per cent. of metallic mercury, by M. Chevret (St. Etienne). This, however, is dependent on a special apparatus. A notice of this paper must therefore be deferred until it is possible to present a sketch of the machine used.

M. Borier read a paper on the action of chaulmugra oil in skin diseases and tuberculosis. The author expressed the opinion that chalmugra oil is a specific for phthisis, leprosy, syphilis, and that its action is parasiticide or germicide. He has not, however, supported his theory by any published experiments.

At the General Meeting on Saturday afternoon, Mr. E. M. Holmes occupying the chair, the report by Professor Planchon "On New Drugs of Vegetable Origin introduced during the last Ten Years into Pharmacy" was read. Several of the authors of the papers next in order not being present Dr. Petresco, of Bucharest, was called upon to read his communication on *Bryonia alba* as a powerful antihæmorrhagic. Dr. Petresco said that his attention had been directed to the plant by one of his pupils, Dr. Elian, and that knowing that this property of the plant was not generally recognised in medical works he had directed a chemical and clinical investigation of its properties. The chemical investigation made by M. Urbeano showed that it contained a bitter principle named

adeleine, a glucoside breine named after (brei, the Roumanian name of the plant), and an acid called breic. These three bodies were exhibited by Dr. Petresco, adeleine being a crystalline powder, and breine and breic acid brown syrupy liquids. The hæmostatic effects of the plant appear to be due to breine. This has been given to animals in the dose of 20 centigrams in 1 gram of water hypodermically injected for rabbits, the toxic dose for the same animal being 1½ gram. Dogs and cats have not been killed by doses of 1·40 gram subcutaneously injected. The alcoholic extract of the plant has been given in doses of 2 to 3 grams a day with excellent success in hæmorrhages, particularly from organs rich in smooth muscular fibre. An interesting point brought out in this paper was the fact that *Bryonia alba* is not purgative like the nearly allied species *B. dioica*, although adeleine has been found in both plants. Instead of breine, however, a glucoside closely resembling it, which has been named bryonine, and an acid named bryonic were obtained.

The next paper, by Dr. L. Butte, gave the results of experimental researches on the physiological and therapeutical action of aqueous extract of a Guaco (*Aristolochia cymbifera*). The drug employed by him was obtained from Tabasco, a province of Mexico. He was unable to find either an alkaloid or a glucoside in the root, but his clinical experiments lead to the conclusion that the drug possesses emetic and cathartic properties, and can only be given in small doses. He has found, however, that when applied externally for the treatment of dry eczema accompanied by intense itching and a burning sensation it gave great relief; the itching disappeared and sleep became possible. The strength of the lotion used was 20 parts of root boiled in 1000 of water, and the lotion was applied in the form of a wet compress. In numerous cases this treatment has proved most successful. In eczema accompanied by exudation the lotion does not answer, appearing to increase rather than alleviate irritation.

A paper by M. Ch. Lecerf on "The Alimentary Value and Therapeutical Use of *Soya hispida*." Attention has already been directed to the value of the seeds as a food in the East, and to their value as a nutritive agent (containing only about 6·40 per cent. of starch, 36·67 per cent. of proteid matter, and 17·00 of fat), Blondel, *Journ. de Pharm. et Chemie*, [5], xviii., p. 537. Egass, *Bull. Gen. de Therap.*, Nov. 30, 1888. Specimens of light soya bread of a light yellowish brown colour that were placed on the table were not considered at all unpleasant to taste, but rather palatable. The author stated that at first the bread had a slightly purgative action, but that this soon passes off as the patient becomes accustomed to its use.

In the paper by Dr. Riffat (Salonica) on "The Treatment of Acute and Chronic Urticaria by Tincture of Strophanthus," it was stated that in ten cases which had resisted other remedies tincture of strophanthus had been found of considerable value, especially in chronic cases. *S. hispidus* was the kind used, and the dose of tincture given was 15 to 20 drops during twenty-four hours. In acute urticaria a single dose has almost always proved sufficient to cause the disappearance of the rash as well as the itching. Dr. Riffat believes that strophanthus gives relief in this disease either by its favourable action in dyspepsia or by removing from the blood the compounds which give rise to the irritation of the nerves supplying the skin.

The communication of Senor A. R. Silva Braya on *Solanum Jurubeba* indicates that the plant is considered in the provinces in which it is collected, Sao Paulo, Minas Geraes and Pernambuco, to be an excellent remedy in hepatic and malarial diseases. He thinks that the plant is worthy of the attention of European therapeutists, and gives a number of formulæ for the preparations used in Brazil. The plant appears to yield about 10 per cent. of soft extract, of which 25 centigrams to 1½ centigrams can be taken in twenty-four hours. This extract is employed in the form of wine, syrup, tincture and ointment.

Dr. Roussel (Paris), in his paper, recommended the subcutaneous injection of volatile antiseptic remedies, such as eucalyptol, on the ground that all such bodies are eliminated through the lungs, and that if inhaled directly through the nostrils they do not reach the substance of the lung or sterilize it, but only a certain portion mixed with respired air enters the minute branches of the bronchi. He recommends olive oil as the medium for administering these antiseptics, the proportions being 5 of essential oil to 20 of fixed oil previously sterilized by heat. His results appear to have been communicated to the Academy by Professor Ball in February, 1886, and this paper, like several others, seems to have been written with the view of calling more general attention to processes, etc., which the authors consider important.

Dr. Bedoin read a note "On Antiseptic Crayons made of Gelose." Specimens of crayons were exhibited to the meeting consisting of slender sticks about one line or less in thickness made of japanese isinglass with which were incorporated various antiseptic medicaments, iodoform, &c. Owing to the enormous bulk of liquid that the gelose will absorb these crayons or bougies swell to three times their bulk and thus they are useful in stricture for dilating the constricted part whilst the substance itself possesses an emollient character. These bougies have a slender metallic axis which can be withdrawn when the gelose has absorbed moisture and become soft, and as the gelose does not dissolve but merely swells, it forms an antiseptic channel for the urine.

Dr. Schaer's report on "The Unification of Weights and Measures employed in Formulæ, and on the Utility of an International Pharmacopœia," was then read, and a resolution was passed to the effect that a universal pharmacopœia comprising all the more powerful and important remedies was most desirable. The proceedings then terminated.

In the evening a banquet was provided on the Eiffel tower, and the members of the Congress subsequently proceeded with one lady (antivivisectionist) to the very top of the tower.

Proceedings of Societies in London.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Wednesday, July 31, at 4.30 p.m.

Present—Mr. Umney, President, in the chair; Professor Attfield, Messrs. Carteighe, Gerrard, Plowman, Ransom, and Mr. Naylor (Hon. Gen. Sec.).

The minutes of the previous meeting were read and confirmed.

Intimations of inability to attend were announced as having been received from Professor Bentley, Messrs. Atkins, Benger, Conroy, Dott, Groves, Martin, Martindale, Proctor, Stephenson, Symes and Thresh.

A preliminary list of officers of the Conference to be recommended to the Newcastle meeting was drafted and agreed to.

The announcement was made that an intimation had been received informally of an invitation to be given in due course to the Conference to hold its 1890 meeting at Leeds.

The Hon. Treasurer submitted a draft of the financial statement for the present year.

In his absence the Chairman compared its leading

items with the corresponding ones in the balance sheet of the preceding year. The result generally was deemed satisfactory.

Mr. S. Plowman, F.R.C.S., announced that it would be no longer possible for him to act as Secretary to the Committee of the Publication of the 'Year-Book.' At his suggestion the 'Minutes of the Year-Book,' with collateral documents, were handed over to the London Secretary, who was then appointed to the vacant office.

A communication from the Chairman of the Formulary Committee was received and commented upon.

Mr. Naylor read a short letter from the Local Secretary, Mr. Clague, in which he reported the withdrawal of the offer to provide luncheon by the proprietor of the Tynedale Hydropathic Mansion, and that in place of it the Local Committee had agreed with the proprietors of the Royal Hotel to serve a "collation" in the Town Hall.

Parliamentary and Law Proceedings.

Prosecutions under the Pharmacy Act.

In Aberdeen Sheriff Court on the 6th inst.—Sheriff Smith on the bench—four cases of dealing in poisons without having the necessary qualification were disposed of. The prosecutions were at the instance of Richard Bremridge, 17, Bloomsbury Square, London, registrar under the Pharmacy Acts, and were conducted by Mr. A. E. Smith, advocate.

The first case called was that of James Anderson, Torphins, who was accused under the 15th section of the Pharmacy Act in a complaint to the effect that he, not being a duly registered chemist within the meaning of the Act, did (1) on June 24 last unlawfully keep open shop at Torphins for the retailing of poisons, thereby rendering himself liable to a penalty of £5; and (2) that contrary to the 17th section of the Pharmacy Act, on June 24 he sold 3 drachms or thereby of the poison known as corrosive sublimate, to John Rutherford Hill, 36, York Place, Edinburgh, assistant secretary to the Pharmaceutical Society of Great Britain, without the said quantity of corrosive sublimate being properly labelled poison, and that accused delivered the said poison to Mr. Hill without entering in a book the date of sale, name and address of purchaser, quantity of poison sold, and the purpose for which it was stated by the purchaser to be required, and did not get the purchaser's signature to any such entry, and thereby rendered himself liable to a penalty of £5.

After some preliminary objections by Mr. Wilson, solicitor (who appeared for accused), had been discussed and over-ruled, accused pleaded guilty.

Mr. Smith then said that the reason of bringing these charges was that it was thought desirable to make these merchants know that they were liable to the penalties for each of the offences mentioned in the Act. The principal object was to put down unqualified dealers in drugs.

Mr. Wilson, solicitor, stated that accused's shop was six miles from any qualified chemist's premises. It was a notorious fact that all over the county of Aberdeen these drugs were sold by parties who were not duly qualified practitioners. This was the first prosecution within the county. The sale of the drugs had been done quite openly, and without intentional offence. Mr. Anderson did keep a book for entering the drugs sold, but by some curious mistake in this case the entry was not made.

The Sheriff said he did not look upon this case as a very serious one. He was happy to think the offences were not intentional, but a simple failure, through negligence, to attend to the regulations. The nature of the prosecutions, he supposed, was to bring home to the minds of men the fact that this Act of Parliament existed, and that its provisions must be respected. He imposed a fine of 5*s.* on each of the two offences charged in the complaint, and also ordered accused to pay £1 15*s.* as the expenses of the prosecution.

Alexander Morren, Tarland, was next accused of selling to Mr. Hill, on June 24, quantities of cantharides, tartar emetic and opium, all poisons. He pleaded guilty, and Mr. D. Mitchell, advocate, stated on his behalf that the poisons were sold from a shop which was under the supervision of a qualified practitioner, but this was denied by the prosecution.

The Sheriff considered that the excuse was no defence at all. It did not remove risk, and the Act held that unless a shopkeeper was qualified to dispense medicines he was not to do so. The fine in this case was again 5*s.* for each of the two offences, as specified in the previous complaint, and modified expenses amounting to £3.

Robert W. Reid, New Street, Kintore, pleaded guilty of selling to Mr. Hill, on June 25, tartar emetic and opium.

Mr. Alexander Duffus, solicitor, tendered a plea of the shop being under competent medical supervision, but the Sheriff imposed a fine of 5*s.* for each of the two offences charged, and payment of £2 9*s.* as expenses.

Alexander Warrack, New Street, Kintore, pleaded guilty of selling tartar emetic to Mr. Hill on June 25, and was fined in 10*s.*, and ordained in addition to pay £2 9*s.* 11*d.* expenses.

Three other cases were settled out of Court by payment of the full penalties and expenses, and on an undertaking being given to discontinue the sales of poisons or medicine.

Review.

Exercises in the Preparation of Organic Compounds. By Professor Emil Fischer. Translated from the Second German Edition by A. Kling, with a Preface by Professor W. Dittmar.

This little book consists of instructions for the preparation of fifty-eight organic compounds whose production involves the investigation of chemical reactions of general interest and of operations which have frequently to be conducted during the study of organic chemistry. It is only comparatively recently that organic chemistry has been made for the student a living subject, at any rate, in this country, by the arrangement of a systematic course of practical work, through which every student has to pass. It is now fully recognized that if organic chemistry is to be made useful to the student in his subsequent career it is essential that he should become familiar with the details of the methods of preparing organic compounds, since it is generally true that reactions which seem simple enough on paper involve operations which are in actual practice very troublesome for the elementary student.

The course of work laid down in this book is one which every chemical student in a German laboratory has for some years past been obliged to traverse. For the pharmaceutical student organic chemistry has a rapidly increasing importance. In the not far distant future it appears almost certain that drugs will more largely consist of compounds of known constitution prepared in the chemical laboratory. It will be expected that the pharmacist's knowledge of the methods of preparation and properties of these compounds is not less extensive and intimate than it now is of the various inorganic compounds that are employed in medicine.

The principles of organic chemistry, the general reactions and the constitution of organic compounds are best learnt in the lecture-room with the aid of a trustworthy text-book written by a master of the subject. But a student may possess all the knowledge thus obtainable and yet not be able to successfully prepare a single organic compound in a state of purity. In order that he may be able to obtain pure compounds something more than a bookish knowledge of reactions is needed, viz., an intimate practical acquaintance with the actual methods of bringing about chemical change and of isolating and purifying the compounds that are formed. This practical knowledge can only be acquired from a teacher who is himself a master of it. Even in what appear to be the simplest reactions, difficulties arise which one who is himself familiar with the manipulative process of organic chemistry is able to overcome, but which seem to be almost insuperable to the untrained worker. Practical organic chemistry carried on without the assistance of an experienced teacher means a series of failures. Professor Fischer's book will be of great assistance to students who are working in a properly equipped laboratory under competent supervision. To students who are thus fortunately placed we strongly recommend these exercises, written as they are by one of the greatest living masters of the science, who is himself an arduous worker and who has within recent years made brilliant contributions to its advancement.

It has, however, to be borne in mind that this book is far from complete in itself. There is no systematic arrangement and the compounds are not tabulated on any definite plan. It is, therefore, a book which will be most useful as constituting a series of laboratory notes to be employed by those who are attending lectures on the subject and a parallel course of practical instruction. As soon as the reactions and constitution of a compound have been fully discussed by the lecturer, the details of the method of preparing it can be learnt by the student from this book, and after the substance has been obtained in a state of purity, its characteristic reactions may be examined.

On the whole, the list of selected compounds is a good one, though it is somewhat weak in paraffin derivatives, and would, of course, need to be supplemented to suit the requirements of special classes of workers.

It is difficult to speak highly of the translation. Having regard to the circumstances under which the book is likely to be used it is perhaps sufficiently satisfactory. It is evident, however, that the translator is not an adept in the subject, since he is unfamiliar with the usual English equivalents for German chemical terms, as, for example, when he speaks in the preparation of naphthalene sulphonic acid, of the naphthalene being "sulphurized," and throughout the nomenclature used is very crude, in fact the compounds are often designated by most undesirable names. The translator would have done better if he had consulted the "Instructions to Abstractors," which have been issued by the Editor of the *Journal of the Chemical Society*, with the view of promoting uniformity in chemical nomenclature. The system there laid down is now coming into very general use, and has already been adopted in several standard works.

BOOKS RECEIVED.

HEALTH TROUBLES OF CITY LIFE. By GEORGE HERSCHELL, M.D., Lond., etc., etc. Bristol: John Wright and Co.

CHEMICAL LECTURE NOTES. By PETER T. AUSTEN. Ph.D., F.C.S. New York: John Wiley and Sons. 1888.

Obituary.

Notice has been received of the death of the following:—

On the 22nd of July, Mr. James Winterborn, Chemist and Druggist, Redborn, Hertfordshire. Aged 74 years.

On the 1st of August, Mr. Henry Smith, Chemist and Druggist, 90, South Street, Liverpool. Aged 73 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE PHARMACEUTICAL SOCIETY AS PART OF A TEACHING UNIVERSITY.

Sir,—In the *Schoolmaster* of the 18th clt. there was an excellent article headed "Why should London Wait?" urging for a teaching university for London. As we are well aware, there is not here—in the first city of the world—a university partaking of the nature of a teaching and an examining body. There are numerous colleges and institutions doing the teaching part very ably, but what is urged is that there should be a university similar to those of Oxford or Cambridge, and that such colleges as King's, and institutions like the Birkbeck, might become affiliated. I need hardly say no mention was made of the Pharmaceutical Society; why should not such a Society become one of the chosen few? No one can deny that the teaching of our worthy Institution is carried out in a most praiseworthy manner, and many of its scholars have proved themselves to be first-class scientific men as well as thorough pharmacists; a proof of this may be seen in the fact that many of our pharmaceutical chemists are fellows of the Chemical Society and Institute of Chemistry, besides many other scientific societies.

The name of a university always brings to my mind the thought of a degree, and I have often thought there ought to be pharmaceutical as well as medical degrees. It occurs to me, now that a reform is being sought for in our London University, that this would be a suitable time for the Pharmaceutical Society to join in the agitation to become affiliated with other colleges who are moving in the matter, to seek to get examinations conducted on similar lines to the Major, but more advanced, to be open only to those who have passed our present Minor and Major for the purpose of conferring pharmaceutical degrees on successful candidates. Why should we not have graduates in pharmacy in England as well as in America? or are we always to be behind in educational matters? It cannot be argued that our subjects studied are not worthy enough, for a great part of the B.Sc. examination consists of them. Surely the elementary training—I mean apprenticeship—of pharmacists would not be too degrading, for it is far above the early work of many medical men, and lastly, the dispensing duties would not render candidates ineligible for such honours. This, at least, would form a new goal for our members to work for, a distinction unique in itself. It would also prevent many of our best men, wishing to go higher with their studies, from entering the medical profession, which is already seriously overcrowded; for it is mainly to receive a distinctive degree that many rush into the ranks of medicine. Surely we are not ashamed of our profession, and our excellent President—the champion of educational reforms—ought to be commissioned to use his talented powers to procure for us a university recognition. Let the chemist adopt these high and noble principles; the public are not slow to perceive distinctive features in a profession, and a means of showing what qualifications are held, is to display their diplomas in prominent parts of their pharmacies. Let us sink paltry tactics, which at the best only bring a small amount of the "filthy lucre," too often the desired goal and degrading influence of many young fellows entering the struggle of life.

164, *Lambeth Walk*. J. WELLESLEY DOUGLAS.

MUSAMBRA, A VARIETY OF EAST INDIAN ALOES.

BY DAVID HOOPER.

Writers on Indian materia medica have described in their works an impure aloes called *Musambra*, said to be made in India. In looking through vernacular lists of drugs of the present day, the word *musambra*, or some other form of it, is seen to be applied generally to aloes, whether imported into India or not, and it will be seen from the following list that the appellation is not restricted to any one part of the peninsula. Mussabar, musabbar (*Hindustani*); musanbar, moosumbir (*Dukhni*); moshabbar (*Bengali*); mussbar, sibar (*Kashmiri*); musambara-bolla (*Mahratti*); mushambarum, moosumbrum (*Telugu*); musambra (*Canarese*). The Telugu name is that used on the Madras Railway, a line running between Madras and Calicut.

The name, speaking with etymological accuracy, is a compound of *mur* and *sibr*, the Arabic names for the two drugs myrrh and aloes. I cannot find, however, that such a compound exists as an article of commerce. It might be difficult to detect the admixture of a small quantity of myrrh in aloes, but any considerable quantity would increase the amount of resins present and interfere with the odour. The samples of musambra examined in my laboratory were free from the addition of any myrrh, and this seems to be the usual experience. Under the head of "Aloes," in the catalogue of the Calcutta Exhibition, it is stated that this drug, "combined with myrrh, constitutes the musambar of Bombay," but I have not been able to obtain a sample. Dr. Dymock says the term *musanbra* is incorrectly used for aloes, which must be true in many parts of India; but as the name has been known for at least a century in Mysore, and as a sample found in that country is different from hitherto described varieties of Indian aloes, it seems to be a subject worth investigating.

Ainslie in 'Materia Indica,' Pt. 1, p. 10, says: "There is a coarse kind of aloe called *musambrum*, common in the bazaars, which is prepared perhaps in India from this species (*A. perfoliata*, Linn.) . . . . . This species of the plant is common in India, though I cannot learn for certain that any of the drug is prepared from it."

J. J. Wood, in the revised edition of 'Materia Indica,' published in Madras, 1871, gives a note as follows:—"Aloes met with in the bazaars, as prepared in the provinces, is variable in quality, usually inferior, being darker in colour than the other kinds, extremely bitter, and having a nauseous taste."

Kanny Loll Dey, in 'Indigenous Drugs of India,' has a paragraph to the following effect: "The bitter inspissated juice (of *A. Indica*) constitutes the medicinal aloes mussubber of the bazaar."

Dr. Kirkpatrick, of Mysore, some twenty years ago compiled a "List of Asiatic Medicines used by the Hakeems, with uses and doses," giving in each case the Canarese and English names of the drugs. Under the name of Moosamber he describes the properties and doses of aloes, without giving a description of the drug or its botanical origin.

Dr. O'Shaughnessy in 'Bengal Dispensatory,' under the article "Aloes Indica, Royle," says it is "probably the source of some of the common aloes (*musabhir*) of the bazaars," which is "black, brittle, of semivitreous fracture, and too impure for medical use."

Most of the above authorities designate the most impure kind of Indian aloes as *musambra*, but not one of them speaks with certainty of its local manufacture from the plant.

The classification of Indian aloes was attempted by O'Shaughnessy and Pereira, and a reference to the varieties distinguished by the names of the countries whence they were obtained, will be of interest in comparing them with our present knowledge of the drug. O'Shaughnessy mentions three kinds, as under:—

Socotrine, imported, 82 per cent. soluble in water.

Kurachi, nearly black, opaque, rather vascular, shelly structure of fracture, faint smell, powder blackish. It is identical with the better kinds of mushaber of the Bengal bazaars. Water dissolves 52 per cent.

Dekkan, deep brown, of earthy and slightly resinous fracture, faint odour, powder brown. Soluble in water in the proportion of 98 per cent.

Dr. Pereira ('Materia Medica,' vol. ii., p. 193) describes six kinds of aloes in India:—

Kurachi, nearly black, opaque.

Dekkan, deep brown.

North India, dull black, brittle, little odour.

Guzerat, dark, more gummy, more difficult to fracture.

Salem, in blackish masses with numerous large air cavities, odour of socotrine.

Trichinopoly, resembling Cape aloes.

Dr. Dymock, in 1881, discovered the source of an aloes prepared in Jafferabad. It occurs in cakes of a black colour and pitch-like lustre. The Kurachi aloes previously described might now perhaps be referred to Jafferabad aloes, and the Salem aloes of Dr. Pereira to *Musambra*. The socotrine aloes as imported might account for some of the other varieties known as "Indian."

The specimen of aloes known as *Musambra*, and bought by the author two years ago in Bangalore, has the following characters. It occurs in thick cylindrical pieces of ½ lb. to 1 lb. or more. The colour is black, and liver-coloured in places where it is broken or rubbed. It breaks or crumbles up into small *angular* fragments, not into laminæ or splinters, as in other kinds of aloes. It is distinctly porous, and small stones and other impurities are seen to be imbedded in its substances. The odour is agreeably aromatic. The powder is dull umber brown. When moistened and examined under the microscope the crystals of aloin only slowly made their appearance, which would imply that there was a smaller quantity than usual of the active principle.

A proximate analysis of the drug gave the following result:—

Water extract	53·8
Resin soluble in acetic acid	10·4
Resin insoluble in acetic acid	8·5
Insoluble in proof spirit	1·9
Mineral impurities	21·8
Moisture	3·6
	100·0

The drug responded to the general tests for aloes. Borntrager's test = a rose colour, Cripps and Dymond's test = deep orange-red. Ditto with ammonia = claret. Nitric acid in the cold = deep

red. Nitric acid vapour passed over some of the powder mixed with sulphuric acid gave no blue colour. The last two tests are characteristic of Barbadoes aloes.

Some plants of the Mysore aloes were obtained from Mr. J. Cameron, of the Lal Bagh, Bangalore, about two years ago, and were planted out in the Botanic Gardens, Ootacamund, for the purpose of flowering them for identification; but the elevation and cold were unfavourable to the growth. Last year, during a tour through Travancore, an aloe similar to the Mysore plant was found to be very abundant, and to be used by the natives in medicine. Flowers, fruits and leaves were brought back and submitted to Mr. Lawson, the Madras Government Botanist, who with very little hesitation referred them to *Aloe vulgaris*, Lamark, the figure of which is represented in Bentley and Trimen's 'Medicinal Plants,' plate 282. The *A. indica* and *A. litoralis*, mentioned in the Pharmacopœia of India, as has been suggested before, might be placed under the denomination of *A. vulgaris*, a plant which seems to be well established, at least in Southern India. *A. vulgaris* affords the Barbadoes aloes of commerce, which gives peculiar reactions with nitric acid and its vapour. The Mysore aloes, in giving similar reactions, confirms to some extent the evidence of its being made in the country from a plant which is so abundant. If the imported article should ever become scarce the natives will not be backward in manufacturing the drug for themselves, if, indeed, this is not already done. The aloes plant is not a true native of India, and the introduced *A. vulgaris* is not at present recognized in modern works of materia medica of this country, but considering its easy growth and the extensive uses to which it is put by the natives in medicine, it will shortly have to take up an official position with other indigenous drugs.

THE CULTIVATION OF MEDICINAL PLANTS IN CAMBRIDGESHIRE.

BY E. M. HOLMES, F.L.S.,

Curator of the Museum of the Pharmaceutical Society of Great Britain.

Having been informed that a portion of the aconite leaves used in commerce is grown in Cambridgeshire, and being desirous of determining how far the plants grown in the same district, as well as in different counties, vary in character, I obtained permission from Mr. W. Moore, of Foxton, who is apparently the largest grower of this plant in Cambridgeshire, to examine the plant grown by him, when in blossom. On arriving at Foxton, I found that besides aconite, belladonna and henbane are also grown by Mr. Moore; only seven acres out of a large farm being devoted to these three medicinal plants, the usual proportion being about three acres each of henbane and belladonna, to one of aconite. A little foxglove is also grown. The cultivation has now been carried on at Foxton for about thirty years. The soil is apparently a mixture of chalk and gravel, with a little clay.

Aconite.—This is planted in rows about two feet apart, and about one foot between each plant. The fresh plantations are generally made in March soon after the leaves appear, when the young plants are divided and planted out. Mr. Moore assures me that young plants are formed on the rootlets, as represented in Bentley and Trimen's illustration, and also at the bases of such stems as lay on the ground. This prolific formation of new roots may possibly arise from the fact that the aconite is usually cut down in the middle of June, when the flowers have begun to open, and the store of nourishment that would have gone to form seeds is probably diverted to forming roots. There does not appear to be any regular demand for aconite root of English growth, and to meet such demand as exists, a few roots are dug up in autumn, generally in October, and dried.

At the time I visited Foxton the plants were in perfection, about half of the flowers being expanded. The leaves were of a full dark green, and the flowers of a deep blue colour. The helmet was not quite so semicircular as in the typical *Aconitum Napellus*, and the inflorescence showed a general tendency to branching. The whole of the plants, however, manifested a remarkable uniformity, were of very robust growth, and were flowering at the proper date, and the leaves possessed the characteristic taste of aconite. This uniformity is due to the fact that Mr. Moore never sows the seed, but always divides the root. Indeed, the plant is cut for making extract while still in flower, and therefore before the seed is formed. Mr. Moore does not, however, make the extract himself, but sends the fresh plant, packed like faggots, to London. The aconite is usually cut overnight and sent off by an early morning train, so as to prevent as far as possible any withering by exposure to the hot sun.

Although the plant is slightly divergent from the typical *A. Napellus*, it possesses the great advantage of uniformity, and the root obtained from it would be therefore far more dependable than the foreign root, either for use in medicine or for chemical analysis.

Henbane.—This is sown in March or in the beginning of April, and is cut about the middle of June in the next year. For drying only the flowering tops are collected, not the stem leaves, and are rapidly dried in hot air in a kiln, in which about 2 to 4 cwt. can be dried in two days. The soil does not appear so well suited for henbane as the deep rich fen land of Lincolnshire, and the plant is frequently attacked in dry seasons with a fungus which causes wrinkling and discoloured spots on the leaves. Here, as elsewhere, henbane is a very uncertain crop, three out of five seasons usually failing to afford a profitable return. The plant, beside being attacked by the fungus, has its leaves riddled with a little beetle resembling the turnip flea, and in the autumn a voracious grub, apparently that of *Mamestra brassicæ*, eats out the central leaf bud of the plant, so that they do not come up the second year. In the autumn the large root leaves are sometimes collected and dried, and are sold under the name of "First cutting of biennial plant," at a lower price than the flowering tops of the second year.

The variety cultivated at Foxton was obtained from wild plants found near Foxton, and has the broad leaf so characteristic of the wild henbane, as distinguished from the narrow thistle-like form cultivated in some counties. No use is made of the henbane roots, although it is hardly conceivable that they should not contain a sufficient amount of alkaloid to pay for extraction.

Belladonna.—This is grown from seed which is

drilled in during the spring. The ground suits the plant admirably, being chalky, and although level is sufficiently porous to ensure the requisite drainage. It is, however, exposed to the full force of east winds, and hence the frosts, if late, are apt to injure it in spring, when it is about 1 ft. or 1½ ft. high. Later on it is in some seasons much attacked by green fly, which causes the leaves to pucker and wither. This generally takes place in the beginning of June.

The plant is usually sold in the green state for extract making, and the leaves are not dried. The plant is cut about the end of June. The second and third year afford the best crop of leaves, and the fourth year the roots are dug up and dried and the seed is sown in another locality. The first year after sowing, the leaves are not fit to cut, so that practically there are only three years during which the plants yield a crop.

Foxglove.—This is only cultivated on a small scale, as the wild plant is largely collected elsewhere for the purpose. The leaves are generally gathered in June from the biennial growth before the flowers have expanded.

In conclusion, I wish to take this opportunity of expressing my thanks to Mr. Moore for the liberal manner in which he has afforded information concerning the details of cultivation, etc., of the above-mentioned plants.

MEDICAL MEN IN FICTION.*

That medical men are making silent yet rapid advances in social position and estimation is becoming evident, even to the outside public. A recent writer in a weekly periodical says, "Outside the profession medical men are assuming important social and political positions, which are hardly sufficiently recognized by the press and the public. Bad times are depriving landlords and their agents and country parsons of much of the local influence they formerly possessed, and in many cases are even driving them from their country houses, while the great diffusion of riches, as shown by the recent report on 'Trade Depression,' has saved the doctor from similar misfortunes, and the lowering of the county franchise has placed him in more immediate contact with the great mass of the voters, and brought them more immediately within the sphere of his daily influence. The tendency, moreover, of local government is in the direction of increasing the power of sanitary boards, and so of increasing the local influence and importance of medical men. A few years ago it was a comparatively rare occurrence for a country doctor to be made a county magistrate, and it was almost impossible to get one or two sent to Parliament, but now both appointments are common, and will become more and more common as medical men recognize their new position and responsibilities. They have no land or tithe question to place them at a disadvantage or breed ill-feeling between them and the voters, and they are not outdone by either the country gentlemen or the clergy in their sympathy and willingness to help the sick and needy, as witness their voluntary professional services at the hundreds of medical charities throughout the country. It is to be hoped," the writer concludes, "they will use their new power wisely and well."

It is not an uninteresting or unphilosophical subject of contemplation to observe how the popular estimation of our profession has altered during past times as shown in general literature.

Passing by Chaucer's "veray parfait practisour," who did not read his Bible, but "loved gold in special," and Shakespeare's "starved apothecary," who for "a consideration" sold Romeo poison, and advancing to the literature of the eighteenth century, we find that medical men, according to our popular literature, were very little esteemed. We find the three great humourists of that age, Sterne, Fielding and Smollett (himself a medical man), agreeing in holding up to ridicule and reprobation the medical men they introduced into their pages.

Dr. Slop, in 'Tristram Shandy,' is believed to be the caricature portrait of a celebrated York antiquarian physician of the day, but from the moment he appears on the scene he becomes a mark for satire and a butt for ridicule. "Imagine to yourself," says Sterne, "a little, squat, uncouth figure of a Dr. Slop of about four feet and a half perpendicular height, with a breadth of back and sesquipedality of belly which might have done honour to a sergeant in the life guards." He enters the room after a ridiculous adventure, all plastered with mud, and disappears from the book in an elegant scene where he bedaubs the maid with a cataplasm, and in return receives something less pleasant in his own face, while his pedantry, professional and religious, his midwifery forceps, and his absurdities, are the constant theme of Sterne's satire. Mr. Shandy may be philosophical, Uncle Toby benevolent, Corporal Trim pathetic, Yorick eloquent; Slop alone exhibits no redeeming quality on any occasion. In a certain passage of the same work, Sterne draws a picture of what would happen if the world were turned topsy-turvy, and he says of the profession of medicine, "In this corner of the picture you would see a son of the divine Æsculapius writing a book against predestination, or perhaps worse, feeling his patient's pulse instead of his apothecary's, a brother of the faculty in the background upon his knees in tears, drawing the curtain of a mangled victim to beg his forgiveness, offering a fee instead of taking one." To do Sterne justice, he never missed an opportunity of laughing at the profession. In his correspondence from France we find, "My physicians have almost poisoned me with what they call *bouillons rafraichissants*; 'tis a cock flayed alive and boiled with poppy-seeds, then powdered in a mortar, and afterwards passed through a sieve. Then there is to be one crawfish in it, and I am gravely told it must be a male one, a female would do more hurt than good."

A Dr. Hill tells the following anecdote of Sterne in the 'Royal Female Magazine' for 1760, and vouches for its truth. "At the last dinner that the late, lost, amiable, Charles Stanhope gave to genius, Yorick was present. The good old man was vexed to see a pedantic medicine-monger take the lead and prevent that pleasantry which good wit and good wine might have occasioned, by a discourse in the unintelligible jargon of the profession, concerning the difference between the phrenitis and the paraphrenitis, and the concomitant categories of the mediastinum and pleura. Good-humoured Yorick at once fell into the cant and jargon of physic as if he had been one of Radcliffe's disciples. 'The vulgar practice,' says he 'savours much of mechanical principles, the venerable Ancients were all empirics, and the profession will never regain its ancient credit till practice falls into the old track again. I am myself an instance; I caught cold in leaning on a damp cushion, and after sneezing and snivelling a fortnight, it fell into my breast. They blooded me, they blistered me, and gave me robs and bobs and lohocks and eglemata, but I grew worse, for I was treated according to the exact rules of the College. In short, from an inflammation it came to an adhesion, and all was over with me. They advised me to Bristol that I might not do them the discredit of dying under

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their hands, and the Bristol people, for the same reason, consigned me over to Lisbon. But what do I? Why I considered that an adhesion is in plain English only a sticking of two things together, and that force sufficient would pull them asunder. I bought a good ash pole and began leaping over all the walls and ditches in the country. From the height of the pole I used to come down *souse* upon my feet like an ass when he tramples on a bulldog, but it did not do. At last when I had raised myself perpendicularly over a wall, I used to fall exactly upon a ridge of it on the side opposite to the adhesion. This tore it off at once and I am as you see. Come, fill a glass to the empirick medicine!"

It might have been hoped that Smollett, himself a physician, would have dealt more gently with his own profession, but since his medical characters have less of burlesque and more of pure caricature in them he almost treats us worse than Sterne did. It is true that Roderick Random, one of his heroes, was a surgeon apothecary, but in one part of his career he was also a footman, and he seems to have abandoned both occupations with equal alacrity when his hour of fortune struck. Smollett describes Crabb and Potion—county practitioners of the day—as villainous compounds of the rogue, the drunkard, and the shopkeeper, and Potion, who turned Random out of doors to become the slave of the more worthless Crab, is a portrait of Smollett's own master, John Gordon, a Glasgow apothecary, while Crab is the likeness of the master of a friend.

The description of Lavement, the French apothecary in London, is little more flattering. This, for instance, was his method of compounding a prescription. "He had a great deal of business, but as he was mostly employed amongst his fellow refugees, the profits were small. However, his expense for medicine was not great, for he was the most expert man at a substitute of any apothecary in London, so that Random was sometimes amazed to see him make up a physician's prescription without the least hesitation, though he had not in the shop one drug mentioned in it. Oyster shell he could invent into crab's eyes, common oil into oil of sweet almonds, syrup of sugar into balsamic syrup, Thames water into aqua cinnamomi, turpentine into capivy, and a hundred more costly preparations were produced at a moment's notice from the cheapest and coarsest drugs in the materia medica, and whenever any common thing was ordered for a patient by himself, he always took care that it should be disguised in colour or taste, or both, in such a manner that it could not be possibly recognized."

Random's account of his examination for the diploma of surgeon's mate at the Surgeon's Hall has a double interest for us, first as casting a strong light on the character of the examinations of the time, secondly, as regards an almost contemporary entry in the books of the college. According to the chronology of the novel, Random's examination would take place about 1740, the scene being written about eight years later. Ten years after "at a court of examiners held at the theatre, December 21, 1758, James Bernard (was found qualified as) a mate to a hospital. Oliver Goldsmith, found not qualified for ditto." But gentle Goldsmith had no stone to throw; in all his works no word of satire or blame for his profession can be found. It is the successful Smollett, not the rejected Goldsmith, who loads the Company of Surgeons with such ridicule.

There is one other of Smollett's characters who requires passing notice, the physician with whom Peregrine Pickle makes acquaintance in Paris, and who provides his fellow travellers with a classical feast. This man with his pedantry, his ignorance, and his ill manners, is believed to be a portrait of Dr. Akenside, the then popular poet-physician, and it is probable, from Lettsom's description of him, that the portrait is not ill drawn.

Fielding has only incidental allusions to medical men and those not of the most flattering description. When Joseph Andrews, wounded, stripped, and half dead is conveyed to an inn, the local surgeon is summoned. Thinking that some gentleman or lady has been hurt, this worthy is half dressed, when a maid from the inn again rings the bell to hasten his movements. "When the wench had informed him at his window that it was a poor foot passenger who had been stripped of all he possessed and half murdered, he chid her for disturbing him so early, slipped off his clothes again and very quietly returned to bed and to sleep."

From the beginning of the present century to about the time of the Crimean war, a very different type of practitioner was introduced into current fiction. In his student days he was wild and full of animal spirits and practical jokes, being neither very studious nor particularly sober. He is represented in this stage of his career by Mr. Bob Sawyer, Mr. Ben Allen, and Mr. Jack Johnson. When duly qualified he developed into a kind-hearted, whist playing, middle-class, family surgeon, somewhat of a time server and a humbug, but honourable withal and nearly always found on the side of virtue. This was the practitioner of Miss Austen, of Thackeray, of Dickens, and of the hundred and one novelists who came between them. Here the apothecary was never taken as a hero, by any chance, and was often only introduced on the scene to certify the heroine's dangerous condition, for the harrowing of the faithless lover, or at best was set in the chimney corner to amuse the inconvenient father while the hero and heroine enjoyed the sweets of uninterrupted intercourse. In Miss Austen's delightful novel 'Pride and Prejudice' the medical man is introduced to attend to Jane's throat, with as little notice or approbation as the butcher might receive who supplied her with mutton chops. Mr. Harris, in 'Sense and Sensibility,' is only valued for his daily bulletin and unfavourable prognosis, which is not verified by the event. The surgeon in 'Persuasion' attends Miss Musgrave all through her accident in a satisfactory manner, but is else a shadow. In 'Emma,' however, we get a full length portrait of this class of practitioner. Mr. Perry was a country surgeon in large practice. His admiring patient, Mr. Woodhouse, says of him "Poor Perry is bilious, and he has not time to take care of himself, which is very sad but he is always wanted all round the country. I suppose there is not a man in such practice anywhere. But then there is not so clever a man anywhere." He does not confuse his patients by variety of climatic recommendations. "Perry," continues Mr. Woodhouse, "was a week at Cromer once, and he holds it to be the best of all sea-bathing places. A fine open sea, he says, and very fine air, and by what I can understand from him, you can get lodging there quite away from the sea, a quarter of a mile off, very comfortable." He was very attentive to his better patients. "Poor little Emma," says her father, "you were very bad with the measles, that is, you would have been bad but for Perry's great attention. He came four times a day for a week. He said from the first it was a very good sort, which was one great comfort, but the measles are a dreadful complaint. I hope whenever Isabella's little ones have the measles she will send for Perry."

Timid Mr. Chillip in 'David Copperfield,' and that worthy practitioner who attended little Nell at the village inn, belong to the same class. We all remember how the latter felt the child's pulse, "and as he did so, eyed the half empty wine glass as though in profound abstraction. 'I should give her,' he said at length, 'a teaspoonful every now and then of hot brandy and water.' 'Why that's exactly what we have done, sir,' said the delighted landlady. 'I should

also,' observed the doctor, who had passed the foot-bath on the stairs, 'I should also,' said the doctor in the voice of an oracle, 'put her feet in hot water and wrap them up in flannel. I should likewise,' said the doctor with increased solemnity, 'give her something light for supper, the wing of a roast fowl now.' 'Why goodness gracious me, sir, it's cooking at the kitchen fire this instant,' cried the landlady, and so indeed it was, for the schoolmaster had ordered it to be put down, and it was getting on so well that the doctor might have smelt it if he had tried; perhaps he did."

Thackeray has drawn in Pendennis the elder an excellent picture of the same type. "Helen Thistlewood had one day hoped for a different lot than to marry a little gentleman who rapped his teeth and smiled artificially, who was laboriously polite to the butler as he slid upstairs into the drawing-room, and profusely civil to the lady's maid who waited at the bed-room door, for whom his old patroness used to ring as for a servant, and who came with even more eagerness. Perhaps she would have chosen a different man, but she knew, on the other hand, how worthy Pendennis was, how prudent, how honourable, how good he had been to his mother, how constant in his care of her," and so she married him.

In the Huxters, father and son, Thackeray has made a much less engaging sketch of men who were simply vulgar and commonplace, and in his fashionable physician, Dr. Brand Firmin, we see a mere humbug and hypocrite, but, as if in compensation Thackeray rises to a higher level than any of his predecessors in his Dr. Goodenough, a type of medical man, which in its essentials of knowledge, honour and benevolence, was as we shall see to monopolise the fiction of the following generation.

The next definite representative of this type is perhaps Tom Thurnell, whose character Charles Kingsley drew in his novel 'Two Years Ago,' published about 1857. He wages an unpopular and unsuccessful war against sanitary defects in the little Devonshire coast town where he practises, and when, in spite of his efforts and in consequence of the sanitary shortcomings of the place, cholera breaks out, he and his two friends fight with the disease to the bitter end, visiting the sick, warning the healthy, and in all ways attacking the causes of the disease. He is an intelligent, kind-hearted, gallant, straightforward man.

The modern novels whose heroes or subsidiary characters are medical men formed on such a model, are legion. In 'The Ladies of Beaver Hollow,' we have George Mildmay, the young surgeon, cheerfully walking miles in the night to the help of a pauper. Mrs. Henry Wood's medical practitioners of this stamp are many, but she had lived in Worcester and took men dear to the British Medical Association for her originals. Miss Yonge, too, Charles Reade, George Macdonald, George Eliot, "Pen Oliver," among others, have given us characters of this kind which will not die.

And so the popular conception of the men of our profession has grown. From charlatans and buffoons they have become in the eyes of their neighbours examples of the very highest and noblest type of humanity.

PRODUCTION OF COTTON-SEED OIL IN THE UNITED STATES.*

Cotton-seed oil is obtained from the seeds of the *Gossypium herbaceum*, and the percentage of oil varies in the seed from 10 to 30. From a report recently issued by the United States Government, it appears that from September 1, 1883, to September 1, 1886, there were exported from New York 88,871 barrels, and from New Orleans 186,720 barrels, making a total of 275,591 barrels from the two ports. The following is the method adopted in its preparation. The seed, when landed at the mill, is first examined. If too damp or wet, it is dried by spreading it over a floor with free access of air, exposing it on frames to the sunlight in warm weather, or by kiln drying. Drying is the exception rather than the rule in the United States. Cotton ginning is so carefully done that the seeds have little or no opportunity to become wet. Besides this, the seed is generally held at the gins for some time before it is sold to the oil manufacturer. The first process in preparing the dry seed for the mill is to free it from dust. This is effected by shaking it in a screen, or in drums lined with a fine metallic net, and containing a strong magnet, to which any iron nails will adhere, these articles being frequently present. From the drums the seeds drop into a gutter, leading to a machine which removes the lint left by the gin. This is done by a gin constructed for the purpose, with saws closer together than the ordinary cotton gin. An average of 22 lbs. of short lint is taken from a ton of the seed. This product, called "linters," is used in the manufacture of cotton batting. The clean seeds are then transferred to the sheller, which consists of a revolving cylinder, containing twenty-four cylindrical knives and four back knives. The sheller revolves at great speed, and as the seed is forced between the knives the pericarp or hull is broken and forced from the kernel. The mixed shells and kernels are separated in a winnowing machine by a strong blast of air. This removal of the husk makes a considerable difference in the meal cake, a dessicated or decorticated cake being, it is said, five times more nutritious and wholesome than an undecorticated cake. Being thus cleaned, shelled, and separated, the kernels are carried by a system of elevators to the upper storey, and then pass down into the crusher rolls to be ground to flour. Cold pressure produces a very good salad oil, and this is the method generally pursued in Marseilles and other European cities for the first pressure, after which the residue is subjected to a second warm pressure. In the United States, however, warm pressure is generally preferred. The meal is heated in a meal-heater for fifteen to twenty minutes to 204° to 215° Fahr. The heated meal is placed in woollen bags, each holding sufficient seed for a cake. The bags are then placed between horsehair mats backed with leather, having a fluted surface inside, to facilitate the escape of the oil under the hydraulic pressure, amounting to 169 tons. With the most improved presses the hair mats are now, however, done away with. The bags remain in the press seventeen minutes, the solid oilcake of commerce remaining behind. This cake forms a superior food for cattle, horses, sheep and swine, and is nutritious, easily digested, and fattening. The crude oil, as obtained from the press, is pumped into the oil-room, and either put into barrels for shipment, or refined. There are four qualities of the oil. Crude oil is a thick fluid, and of a dirty yellow to reddish colour; on standing, it deposits a slimy sediment. The second quality has a pale orange colour, and is obtained by refining the crude oil, which is done as follows:—After weighing, the oil is pumped into refining kettles. These are of various sizes, the largest ones being 20 to 25 feet deep, and 15 feet in diameter. These tanks are furnished with steam coils for the purpose of heating the oil, and with appropriate machinery for keeping it in motion. A solution of caustic soda is used for refining; this solution is made from 10° to 28° Beaumé in strength, and varying quantities are used, according to the nature of the oil operated upon. After the addition of the caustic soda the mixture is stirred up for forty-five minutes, and kept at a temperature of 100° to 116° F. The contents of the tank are then allowed to stand from six to thirty-five hours when the solid matters—

* From the *Journal of the Society of Arts*, July 19.

soap and substances precipitated by the caustic alkali —gather on the bottom. This mixture is called "foots," and is used for making soap. The yellow oil resulting by this process is further purified by being heated and allowed to settle again, or by filtration, and is called summer yellow oil. Winter yellow oil is made from the above material by chilling it until it partially crystallizes, and separating the stearine formed, about 25 per cent., in presses similar to those used for lard. The cotton-oil stearine is used for making butterine and soap. The yellow oil obtained as above is treated with from 2 to 3 per cent. of fullers' earth in a tank furnished with apparatus for keeping the mixture in motion. When the fullers' earth has been thus thoroughly mixed with the oil, the whole is sent to the filter press. The fullers' earth has the property of absorbing or holding back the yellow colouring matter, so that the oil which issues from the press is almost white. The colouring matter, termed *gossypin*, is collected in a filter, carefully washed to remove any trace of acid, and dried slowly at a low temperature. It is then ready for use as a dye, and gives fast colours on both silk and wool. It is claimed that the quantity of colouring matter in a ton of crude oil is 15 pounds, although this proportion must vary considerably. Its properties are insolubility in acids, slight solubility in water, free solubility in alcohol or alkalis. In its dry state it is a light powder of a pungent odour, of a brown colour, and strongly tinctorial.

THE "ABERDEEN DAILY FREE PRESS" ON THE SUPPLY OF POISONS.

"Some one department of science, otherwise it may be of an abstruse nature, or at any rate relegated to specialists, is constantly receiving a fillip—so far as the interest of the general public is concerned—from some practical topic of the day. A cholera scare, or a hydrophobia panic, leads a certain class of people into studies of recondite investigations, and probably science may get real assistance from the increased interest. The subject of all-absorbing public attention at present is that of poisons. Mrs. Maybrick's trial has raised the interest of the public in general on this subject; while the recent prosecutions in Aberdeen under the Pharmacy Act lend more than ordinary interest to the topic locally. The subject of poisons has long been a very fascinating one in literature and in science, and an unusually troublesome one in law. At first a mere amusement for continental alchemists, it has become dignified into the science of toxicology, with a perfect literature of its own. Law has also grappled with the subject, but what is suggested in the present instance is the incomplete nature of both. Eminent specialists in the Maybrick trial failed to agree that arsenic was present. It happens that this particular poison is actually one of the easiest to detect even in infinitesimal quantities, and yet the first toxicologists of the day failed to agree on its presence. A return made of deaths from poison from 1876 to 1880, inclusive, showed that out of 1581 cases only 67 were from arsenic, 28 of these being suicides, 37 due to accident, and 2 to deliberate crime. We are told that the use of the poison for criminal purposes is a positive blunder. But the scientific side of the subject is not of such moment to the general public as the administration of the law in connection with it. It is true that in one way it is exceedingly difficult to procure a poison—the name, abode, and calling of the purchaser, the purpose for which the poison is required, and the quantity sold, all being duly recorded by the vendor, and the record signed by the purchaser. The law also lays down that no person is allowed to sell arsenic to an unknown individual unless in the presence of a witness known to the seller; and that the drug, except for medicinal purposes, and according to a doctor's prescription, must be adulterated with indigo or soot to the extent of half an ounce to every pound. Such is modern legislation on the subject. But the sale of poisons has proved a very troublesome nut for law, in most countries, to crack. In some countries its sale, as in Mantua, according to the drama, meant 'present death.' In Scotland, as early as 1450, law prescribed that no poison whatever was to be brought into the country, so that the present regulations, strict though they may seem, are not so rigid as some of their predecessors. But law is completely baffled in two ways. Non-qualified chemists, in fact, mere country merchants, constantly evade the law. The recent trial of three such cases in the Sheriff Court exposed only a few from a whole host of similar offenders. The prosecutor's deputy found no difficulty in getting a quantity of corrosive sublimate, a very deadly poison, in a shop at Torphins, which was not a duly registered chemist's; while at other villages he purchased other poisons with perfect publicity. Not only were these offenders not registered chemists, but they demanded no guarantee (even to make some semblance to law keeping) from the purchaser. Such cases lead to the belief that the particular section of the Pharmacy Act dealing with the question is not strictly kept. This is a very dangerous state of affairs from more than one point of view. In the first place it is placing temptation within easy reach of all. The art of poisoning will become exceedingly easy, while it would be equally difficult to detect the criminal. The present law is some sort of barrier to the crime, but such evasions break that barrier down. But what is perhaps a far greater danger is the fact of a non-qualified salesman—it may be an ignorant boy—promiscuously dispensing the most deadly drugs. People rightly regard with suspicion the honest merchant, whose sphere is to preside over the sale of butter and eggs and a pound of cheese, meddling with a subject which needs years to master. The man who deals in treacle and soft soap one minute, and proceeds to dole out corrosive sublimate or arsenic the next is, to say the least of it, an individual to be avoided; and the sooner he comes to know that there is a certain law called the Pharmacy Act the better will it be for everyone concerned. But there is another and much more effective way in which the law is broken—the way in which the Court held Mrs. Maybrick murdered her husband. One may find arsenic or other poisons in articles of everyday use—in fly papers, rat poison, or other vermin destroyers; in certain cosmetics, and in numerous other ways. Does not this suggest that legislation is not strict enough on the point? It is perfectly true that there is not a law through which a carriage and six might not be driven, but such a flagrant evasion as this is notorious. The trial of Mrs. Maybrick may lead to some amendment in this law, as it will lead to an agitation for a Court of Appeal, and if it does nothing more it will not be in vain."

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NEWCASTLE.

IN the programme of Conference arrangements put forward by the local committee, no visits to factories have been included. But the matter has not been lost sight of, and the omission on the part of the organizers of the Association and Conference meetings is due to the difficulty of giving a large party of visitors an adequate insight to the work of a factory. That is in some cases insuperable, and this year a plan is to be tried by which the preservation of cards of membership will secure admission to a number of typical works on the Tyneside and district, so that it will be an easy matter for those who desire to have a more intimate acquaintance with local industries to extend their stay, and their sight seeing, by forming small parties to visit those places of interest most in accord with individual wishes. For the present, then, it may suffice to pass in brief review the industries of the river banks, and the great business of shipping for which the estuary of the Tyne is so famous.

In the higher reaches of the river lead and iron are found; lower down coal is worked and coke made from it, while at the point where the stream becomes navigable the coal producing district of Durham county spreads itself broadly away to the south, extending to the Cleveland district. Nearer to the sea, and stretching along the coast to the northward for thirty miles, is the Northumberland coal-field. The Durham colliers number about 75,000 and those of Northumberland about 25,000.

The quantity of coal which leaves the Tyne by sea is readily ascertainable, and according to the returns of the River Tyne Commissioners, the coal shipped in 1888 amounted to upwards of ten million tons, showing a slight increase as compared with 1886. In 1887 there was a slight decrease, due to the disastrous strike in the collieries on the Northumberland side, whereby the whole of the pits were laid idle for four months, and 25,000 men were thrown out of employment.

The vessels leaving the Tyne in 1888 were 13,645 in number, and their aggregate tonnage 6,269,105. By far the largest portion of the shipping is Tyne owned and Tyne built, and the shipbuilding yards of this district play an important part in providing the fleets of maritime nations, both warlike and mercantile. For, while there has been a lamentable decrease in the success of the local chemical trade, enormous strides have been made in that of ship-building in the district, which now holds the premier position in the kingdom in regard to the construction of that mighty fleet which makes "Britannia rule the wave," and in the building of vessels for other nations.

Last year only two wooden vessels, and these of very small dimensions, were built on the Tyne. But this is more than compensated by the extent of the iron and steel shipbuilding of to-day. The year 1888 possessed a double interest to those who like to mark the progress of the age, for it was at once the centenary of steam navigation and the jubilee of the passage of the Atlantic by steam-driven vessels. From the carefully compiled and exhaustive annual report of the *Newcastle Chronicle* it appears that the number of ships built in 1888 in the districts of the Tyne, Wear, Tees, West Hartlepool, Whitby and Blythe, was 278, the aggregate tonnage being 506,897 out of a total of 903,687 for the whole of Great Britain and Ireland. The fluctuating character of this trade may be gathered from the following data:—

	1881.	1882.	1883.	1884.
Tonnage built	1,000,000	1,200,000	1,250,000	750,000
	1885.	1886.	1887.	1888.
Tonnage built	540,422	473,675	578,668	903,687

It will, of course, be borne in mind that above all other trades that of shipbuilding affects other industries in its variations, for the materials involved spread themselves over a large number of manufactures of a dependent character.

Almost the whole of the manufacturing district of the Tyne is embraced in one or other of the Conference excursions, and in brief review it is proposed to indicate the situation of the various works, not exactly following the line in which they will then be presented, but beginning at the sources and proceeding towards the sea. Where the South Tyne rises the watershed is rich in silver lead ore, and there is to be found the valuable Greenhurth mine, while the Tyne tributary, the Allen, flows through the rich mining district owned by Mr. BEAUMONT. The annual yield of this district has reached 20,000 tons of lead ore, which is worked up, together with imported ores, into varied products in important lead works nearer to the sea. On the North Tyne iron mines are worked. Lower down the collieries of Prudhoe, Wylam, Ryton, Stella and Throckley are found, and then begins a series of works which stretches with hardly a break for eighteen miles to the sea. On the north side are the steel works of Messrs. JOHN SPENCER and SONS at Newburn,

whose special features are anchors and the large steel frames employed in shipbuilding. Lower down on the other side are Swalwell Ironworks, and a little farther on the north bank the vast area of the Elswick Yards is reached. As many as 15,000 men have found employment here at one time. The Armstrong guns are constructed here, as well as the scarcely less deadly quick-firing ordnance, the leviathan breech-loading 110-ton gun, requiring a charge of 1000 pounds of powder, and discharging a missile of 18,000 lbs. with a muzzle velocity of 2128 feet per second, and also the perfected Gatling, which discharges 104 rifle bullets in two and half seconds. By the amalgamation of the ARMSTRONG firm with that of C. MITCHELL and Co. the entire work of constructing an ironclad, fitting her with engines, and arming her with guns is accomplished by this one vast concern. From this yard was launched the warship *Victoria*, which divides, with her sister ship, the distinction of being one of the two largest vessels afloat. The fact that she was launched fourteen miles from the sea furnishes proof of the success of the Tyne Commission in rendering the river navigable by large craft. Perhaps the most signal superiority of the firm may be found in the application of hydraulic power to the handling of monster cannon. The financial success of the concern may be guaged by the fact that the present price of the stock is £215, original stockholders receiving 11 per cent. dividend.

On the south bank of the river, at Dunston and the Teams, are creasoting works and various industries connected with the chemical elaboration of tar products. Lower down, both sides are occupied by locomotive works, those of the North Eastern Railway Company at Gateshead and of HAWTHORN, LESLIE and Co., and the historic firm of ROBERT STEPHENSON and COMPANY on the Newcastle side. The High Level Bridge is then reached, and passing by the wharves of Newcastle Quayside there are on both sides numerous factories whose names are familiar to commercial men. The Newcastle Chemical Works spread like a town on the south side, while opposite are the largest marine engineering works on the Tyne, those of Messrs. HAWTHORN, LESLIE and Co. Shipyards and engineering works rapidly succeed each other, with chemical works interspersed. Wallsend has lost its distinction for coal; it has now, however, aluminium works which may have a great future. Jarrow is here on the right, and PALMER'S immense works merit notice not only from their size but also from completeness. Iron ore is brought in at one end and steel clad ships are launched fully equipped at the other. By the sharpest of transitions from this black and busy scene, the name of Jarrow and the old church near the river cause our minds to turn to old Saxon times, for this was the home of the venerable BEDE.

Then the docks are approached. On the south side are the Tyne Docks of the North Eastern Railway Co., and on the north the Northumberland and Albert Edward Docks of the River Tyne Commissioners, presenting unequalled facilities for the loading of coal. Fast sailing vessels created a demand for rapid shipment, and every day steamers of 3000 or 4000 tons go empty to the coal staiths and next tide leave again, their capacious holds having been filled with a celerity that is perfectly bewildering. Beyond these are North and South Shields, whose piers are stretched forward to shelter this long harbour from the North Sea beyond. Here the visitor—his ears still ringing with sound of the hammers of the shipyards and other sounds of busy life—may step ashore to seek the quiet of a stroll along the sands on either side, or to visit the ruins of the old priory of Tynemouth standing on its bold promontory of rock.

A sketch of the ground to be traversed on the Thursday excursion will close this article. Leaving the Central Station and passing rapidly along the line of the Elswick workshops and other factories, the Tyne is crossed at Scotswood, just above the Suspension Bridge and beyond the entrance of the River Derwent. Then catching a parting whiff of chemical fumes and smoke Blaydon is passed. The Tyne here changes its character; very soon its sylvan scenery and broad windings through a lovely valley give an earnest of the rural beauty of a journey through its higher reaches. But if the travellers were afoot the tongue of a good guide would not move fast enough to tell its records or point out its prettiest peeps. Wylam, the birthplace of GEORGE STEPHENSON, is the village opposite when the first bridge is reached; the cottage where he was born is at the east end of the village. The castle on the hill top on the left just as the next station is passed is Prudhoe Castle. This site with the land surrounding it was bestowed by the Conqueror on one of his followers, whose family in the early part of the twelfth century built this stronghold. The next stream coming down from the south is Cherry Burn, on whose banks BEWICK, the father of wood engraving, was born, and to its rustic scenes he owed his love of the poetic and the beautiful, which found such eloquent expression in his artistic work. On the right are the woods of Bywell, backed by a fine tier of woodland away to the north. Soon Corbridge is reached, where the ancient Watling Street crossed the Tyne. The burn tumbling down from the south, midst wooded banks, is the Devil's water, once the home of the Earl of DERWENTWATER, whose warm espousal of the cause of the STUART family, to which he was related, cost him his head after the defeat of "Bonnie Prince CHARLIE" in 1715.

Hexham shows up well from its picturesque and commanding situation near to the confluence of the

North and South Tynes. The town itself is interesting ; its quaint streets with quainter names lead to the Market Square. The Abbey church there is a puzzle to the antiquary! Its crypt is Saxon, but built with Roman stones, bearing the names of SEVERUS and others. The church was built in 674 by Bishop and Saint WILFRED ; it was destroyed by the Danes and rebuilt in the latter part of the twelfth century. Much of the glory of the old Abbey has departed, but there is still a solemn beauty in its lofty transept, and enough remains of carved work in wood and stone to show what it once was. In the Abbey are stored many Roman remains that have been found in the town. The Moot Hall and the old Castle are close by. The rising ground above Hexham is very beautiful and affords magnificent views of the Tyne valleys. So far the route has been westward, keeping to the line of the river, and parallel to the course of the Roman Wall, which four or five miles north still preserves a well marked line. On resuming the train journey the Border Counties Railway Line leads up the valley of the North Tyne and across the Roman Wall near to Chollerford past several castles to Reedsmouth junction ; it then runs east for a few miles and then again north, climbing by steep gradients until Rothbury is reached, splendidly situated among the purple heather in the beautiful dale of the Coquet. As the train slows and the traveller looks for his ticket he may sigh to think that it is a return ticket "available only for the day of issue." But if he be a wise man (as of course all pharmacists are) he will hasten to drink all he can of the beauties of Cragside, which lies charmingly before him with all that art can do to make the scene more lovely.

THE QUESTION OF RAILWAY RATES FOR MERCHANDIZE.

A CIRCULAR has been issued by Mr. COURTENAY BOYLE, the Assistant Secretary of the Board of Trade Railway Department, in reference to the mode of procedure proposed to be adopted at the hearing of objections to the classification of merchandise traffic and schedules of maximum rates applicable thereto, which have been submitted by the Railway Companies under the provisions of the Railway and Canal Traffic Act, 1888. The first of a series of sittings of the Board of Trade for the hearing of objections will be held on Tuesday, the 15th October next, at 8, Richmond Terrace, at 11 a.m. The Board of Trade considers that the course most convenient to adopt in dealing with this matter in the public interest will be to afford all persons who have forwarded objections to the several classifications of merchandise traffic and the corresponding schedules of maximum rates, the opportunity of appearing before the Board at its sittings in support of their objections, and the several railway companies the same opportunity of appearing in support of their proposals. In this way it may be expected that there will be an rrangement arrived at satisfactory to both parties concerned, as it seems improbable that the railway companies should be influenced by other considerations than such as would be conducive to an increase of traffic.

The Board of Trade proposes that as far as possible uniformity should be introduced into the classifications, general conditions and schedules of maximum rates throughout the United Kingdom, and it is also desired to avoid the inconvenience and expense that would be incurred if it were necessary to discuss the objections in the case of every schedule submitted by the railway companies. With those objects in view it is proposed to take the classification and schedule of the London and North-Western Railway Company as the basis for discussion, so that persons who have lodged objections to the schedules of any other railway company will be allowed to appear and support them so far as they may be applicable to the schedule of the London and North-Western Company. Objectors will also be allowed to appear themselves, or to be represented by duly authorized persons.

We learn from the Secretary of the London Chamber of Commerce that a letter has been received from the Board of Inland Revenue stating that it has been decided to adopt further amendments of the regulations relating to the export of medicinal tinctures. In future the name of the person for whom the tinctures are bottled, or some distinguishing mark without the name, is to be placed on the outside of the case, instead of the maker's name, on condition that the licensed maker, after filling in the requisite form, will write after the particulars of notice the full name and address of the person for whom the tinctures are bottled, and in whose name they are to be exported, or specify instead the distinguishing mark which the exporter intends to use. General instructions to that effect will be issued without delay to the Board's officers.

* * *

It will be seen from our reprint of an article in the *Aberdeen Daily Free Press*, at page 126, that the opinions we expressed in regard to the sale of poisons by unqualified persons have been endorsed by that paper, and the impropriety of allowing general dealers in country places to sell poisons has been fully recognized. So far from regarding it as a hardship that the legal restriction of the sale of poisons should be enforced, it is held that the man who deals in treacle and soft soap one minute, and proceeds to dole out corrosive sublimate or arsenic the next is, to say the least of it, an individual to be avoided, and the sooner he comes to know that there is a certain law called the Pharmacy Act the better it will be for every one concerned. This is a common sense view of the matter that ought to commend itself to the most ordinary capacity, and suffice to relieve the Pharmaceutical Society from reproach for putting the law in force. It might no doubt be more appropriate if this duty were confided to the police authorities, and that arrangement would have the effect of saving the Society from the considerable expenses incurred in these prosecutions for the unlawful sale of poison. But while the law remains as it is the duty rests with the Society, and in performing that duty the Society is rendering a public service.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council was held on the 7th inst., at the rooms of the Society, No. 11, Harcourt Street, at three o'clock.

The President, Mr. Charles Evans, in the chair.

The other members of the Council present were the Vice-President, Mr. Payne, and Messrs. Wells, McCormack, Whitla, Beggs, Merrin, Simpson, Professor Tichborne, and Mr. Hodgson, Treasurer.

A letter was read from Mr. Hodgson stating that he withdrew his resignation in compliance with the unanimous request of the Council, as he would be extremely sorry to take any step which would be in the slightest degree injurious to the Society, particularly at the present crisis.

The President: I am sure it is a pleasure to us all to receive this letter from Mr. Hodgson and to see him amongst us again to-day. As I stated on the last occasion, he would be a serious loss to the Society if he were to leave us at this juncture, because of the care and ability which he has always devoted to our affairs.

Mr. Hodgson: Mr. President and Gentlemen,—I feel indebted to you for a great many kindnesses bestowed on me in past years; and while I felt constrained under the circumstances to send in a resignation, as you thought that the loss of my humble services would be injurious to the Society, I could not as an original member of it bring myself to carry out my original intention. I was fortified in that by several very kind letters which I received from members of the Council pointing out that my retiring at this particular time might have an injurious effect. Under the circumstances I thought it better to withdraw my resignation and endeavour to do my best for your interests in the future as I have done in the past.

The Vice-President said that although frequently Mr. Hodgson and he had not agreed on some points, yet nothing would have given him greater sorrow than his retirement.

Mr. Hodgson: I beg to return my thanks to you all for your kindness, and I hope I shall prove myself worthy of it.

A letter was read from Mr. William Allen, expressing his thanks for the kind wishes of the Council, conveyed in a letter of the 3rd instant, but stating that he could not see his way to accede to the request of the Council expressed in the resolution passed at the last meeting that he should continue to act on the committees, as he should not be able to attend either of the two meetings of the Council that would take place during the remainder of his term of office.

Mr. Wells: That is only a resignation with respect to committees, but it is his intention to resign membership of the Council.

Mr. Hodgson asked was it not possible to bridge the matter over? There was no more useful member of the Council than Mr. Allen. His knowledge of practical pharmacy was great, and they wanted a man of his calibre among them. He had filled the Presidential chair and had been at all times a most active member of the Committees. Therefore his loss, if he retired, would be a serious one.

Mr. Wells said he could endorse every word that Mr. Hodgson had said. He had known Mr. Allen intimately in connection with the Council for some years and could bear testimony to the fact that he was a most regular attendant at the committees and one of the very best men on them. He had also given a great amount of time and attention to many things connected with the Society, more especially the examinations. It was to Mr. Allen that the present high standard of their examinations was due. He went to great trouble about them, visited the English Society's examinations and collected information from different sources, by means of which he had brought the examinations of the Society to a standard that they need not be ashamed of. He believed he could say without fear of contradiction that there was very little difference now between the examination of their Society and the Major of the English Society. He had spoken to gentlemen who had passed both and who had told him that in chemistry one examination was certainly as stiff as the other. To Mr. Allen that was due. He had had a long conversation with him that morning, and he feared he had made up his mind to retire, as he had not been very strong for some time past and his medical adviser had recommended him to take things a little easier. It would be useless again to ask him to remain on the Committees, but he thought it would not be out of place to address a communication to him to the effect that having heard that he was about to resign his seat, they strongly requested him to reconsider that determination. Mr. Allen had had more practical experience of the working of the Council than any of them.

The President: I can endorse everything that has been said about Mr. Allen. When I was Examiner and he was Visitor at the examinations I had a good deal to say to him. Perhaps he might be induced to remain on the committees till the end of the year.

Mr. Hodgson: Would it be out of place for two or three members to call on him and try to induce him to reconsider his determination, at least so far as membership of the Council is concerned?

Professor Tichborne: Is his resignation before the Council?

The President: No.

Mr. Wells: It is implied in his letter.

Professor Tichborne: What I would suggest is that an attempt should be made in a private way to induce him to remain on the Council. It would hardly do to take formal notice of a resignation that does not exist.

Mr. Simpson said he had had a conversation with Mr. Allen and he was then perfectly undecided about remaining on the Council, although he had made up his mind that he could not attend the Committees.

Professor Tichborne: I propose that the President and Mr. Hodgson be requested to call on him with the view of inducing him to remain on the Council.

Mr. Simpson: I have great pleasure in seconding that.

The motion was unanimously agreed to.

Letters from Mr. R. J. Downes dated the 2nd, 9th and 10th of July were read protesting against the election of a President and Vice-President at the July meeting of the Council and also protesting against a suspension of standing orders which took place at the June meeting.

The Vice-President: I move that that letter be simply marked "read." If members of the Society do not feel satisfied with the way in which the Council conducts their business they have their remedy.

Professor Tichborne: Well, I would be rather inclined to treat the letters of a member of the Society with a little more respect, more particularly as we have a good answer to give him. It is merely necessary for the Registrar to refer him to clause 7 of the Pharmacy Act (1875), which is as follows:—"The persons by this Act named as president and vice-president of the said Council, and their successors in such offices respectively, shall hold the office of president and vice-president respectively during one year, but shall be eligible for re-election, and in case of any vacancy in the office of president or vice-president of the said Council caused by such president or vice-president ceasing to be a member of the said Council, or by the resignation or incapacity of any such president or vice-president, such vacancy shall be filled by the election

of some member of the said Council to fill such vacancy." In other words, we were not only within our rights in what we did, but were absolutely commanded to do so. As regards the suspension of the bye-laws we have a right to do that also if the Council be unanimous on the point.

Mr. Wells said that the name of Dr. Gordon was at the end of the list of candidates for membership, and all that was done was to suspend the standing orders for the purpose of taking his election first in order that he might afterwards be elected a member of the Council.

The Vice-President: Which the Council had a perfect right to do.

Mr. Wells said as to the leave asked for, the use of the room by the Irish Pharmaceutical Chemists' Association, he was personally asked to try to get the thing carried. It was a very small matter, and he believed the President would have had a right to grant the leave without coming to the Council at all. He seconded the motion of Professor Tichborne.

The President said he would be sorry Mr. Downes should think that any letter of his was slighted, but that Mr. Hill's request was only a formal matter, whereas Mr. Downes made a very serious charge against the Council.

Mr. Hodgson said Mr. Downes was an old member of the Society and a clever and intelligent gentleman, and it would be desirable to give him an answer, although he (Mr. Hodgson) quite agreed that the Council were perfectly within their rights in what they did.

It was ordered that the Registrar should write a reply to Mr. Downes, directing his attention to the section of the Act relating to the election of President and Vice-President, and pointing out what were the rights of the Council in the matter referred to. A letter was read from the Irish Pharmaceutical Chemists' Association, requesting that the President would as soon as possible call a general meeting of all members and licentiates of the Society, in order to consider their present position in connection with the proposed Pharmacy Act (Ireland) 1875 Amendment Bill.

The Registrar was directed to write to Mr. Hill, suggesting that the matter should be held over until the annual meeting of the Society.

A letter was received from Messrs. Casey and Clay, on the subject of their charges in connection with the promotion of the Pharmacy Amendment Bill of 1888.

It was ordered that they should be requested to furnish particulars.

A letter from Mr. A. R. G. Clark asking that his Practical Pharmacy certificate should be returned to him, as it was his indenture paper. He had asked from the firm with whom he served a signed declaration of his having served the apprenticeship, which he would be prepared to send to the Council instead of the indenture paper. Letters from Messrs. R. I. Galbraith and J. S. Gilbert also asked that their Practical Pharmacy certificates should be returned to them, and undertook to forward copies.

Mr. Wells said that in consequence of it having been discovered on former occasions that bogus certificates were sent in, a resolution was passed by the Council that the candidate's pharmacy certificates should be kept and filed. He did not of course for a moment say that the gentlemen who now asked for their certificates had sent in bogus documents; but the rule had been made on the subject because, if the certificates were given back, and it were afterwards discovered that the party had not *bonâ fide* given the required period of service the Council would have no evidence to act upon.

Professor Tichborne: I am afraid we cannot impound a man's indentures.

The President: Would not copies of the documents answer our purpose?

Mr. Wells: No; because if you took proceedings against a man for obtaining a degree under false pretences you should have the original certificates.

Mr. Hodgson said if the original certificates passed out of the hands of the Council they would be powerless. He thought for reasons into which he need not enter that they should be retained; but not indentures.

On the motion of Professor Tichborne, seconded by Mr. Simpson, it was ordered that Messrs. Clark, Galbraith and Simpson should be requested to send certificates from their employers for the purpose of being filed and that the original documents would then be returned to them.

The President said the next matter was a letter which had been received from the Committee for the organization of the Seventh International Pharmaceutical Congress at Milan in September, 1890, asking whether any members of the Council would attend to represent the Society there.

The Vice-President suggested that the letter should remain on the table for a month, and gentlemen could report to the next meeting of the Council whether they intended to go or not.

A letter was read from the Honorary General Secretaries of the British Pharmaceutical Conference asking for the names of the gentlemen to be appointed as delegates to attend the meeting.

On the motion of Mr. McCormack, seconded by Mr. Merrin, Messrs. Wells and Beggs were appointed delegates to the Conference.

A letter was read from the Liberal Pharmaceutical Association asking for the use of the Society's rooms for their meetings.

Mr. Wells: We are a non-political body, and I object to such titles as "Liberal" or "Conservative."

The Vice-President: We have always opposed the introduction here of anything approaching politics or religion, and I think it highly desirable that we should continue in that course. The title of this society when I saw it on the agenda paper certainly struck me.

The President: I quite endorse the Vice-President's remarks. Still it is a question whether the word "Liberal" in this title is political or not.

Mr. Hodgson said he did not at all like the idea of their rooms being used for any purposes outside those of the Council and the Society. If they had a house of their own they should be delighted to make it available for any purposes connected with the legitimate objects of the Society; but their Council room had been got up at considerable expense, and he did not like its being used by anybody. They had already granted the use of the room to one association, and now they had another asking for it.

The Vice-President moved that a reply be sent to the letter stating that as politics were never admitted into the discussions of the Society, and as the title of the applicant's society conveyed the idea of a political association, the Council felt obliged to decline to lend their room.

Mr. Wells seconded the motion, which was unanimously agreed to.

The Vice-President moved, pursuant to notice:—

> "That members summoned to and attending special meetings of the Council residing outside the city of Dublin be refunded first-class railway fare to and from such meetings."

The position of the country members of the Council should be considered. Some of them lived at long distances from Dublin, and had to spend more than one day in coming to the meetings and going home again. The members of the Council would observe that this resolution did not apply to the ordinary meetings of the Council, but only to the special meetings. It was possible that within a week or ten days after

an ordinary meeting they might be summoned to attend a special meeting. The city members no doubt did not wish to transact important business without having their country brethren to assist them; but if the country members did not attend great power was left in the hands of the city members. Besides, the holding of numerous special meetings was not fair to the country members, and it was rarely necessary. One of the objects of his motion was to try, if possible, to check the number of special meetings.

Mr. Hodgson said he quite went with the Vice-President in his movement. He thought it a very great hardship that gentlemen living at long distances from Dublin should be obliged to come there two or three times a month, and he would be very glad if they could see their way to relieving them of some of the expense of it; but there ought to be some radius. He (Mr. Hodgson) lived outside the city, but he did not ask first-class fare to and from Miltown.

Professor Tichborne said the Society could hardly afford to pay £12 for the railway fare of all the country members attending a meeting. He would be quite willing to do so if possible. He would pay the whole of them if he could; and certainly the Vice-President, in order that they might have him at all the meetings. But he would suggest that the motion should be postponed until they saw what their financial position was. They were not likely to have any special meetings before the next annual meeting of the Society. He did not think that at present the Council should commit themselves to what would amount to an outlay of £75 per annum if they were to pay the expenses of the country members for all the meetings.

The Vice-President: Professor Tichborne misunderstands my resolution. It only refers to the special meetings.

Professor Tichborne: I understand that; but I would like to carry out your principle, if it were possible.

Mr. Simpson said that when a special meeting was called merely to fill a vacancy on the Council it would be hardly necessary for the country members to attend it.

Mr. McCormack: We had three special meetings lately about the Pharmacy Bill.

Mr. Wells said he approved of the Vice-President's resolution. He thought they should not have any special meetings unless there was great occasion for them. Very recently there had been four meetings within one month; and if such a resolution as the one now proposed had been on the books that never would have taken place. He would second the Vice-President's motion.

Mr. Whitla said that as one of the members of the Council whom this proposal would affect he would support it in order to keep down the special meetings. Within one month he received four summonses for meetings of the Council, including the ordinary one; and one of the special meetings was within a week of the ordinary one. On that occasion they had very little information as to what business there was to be done; but he came to the conclusion that the then President would not have called a special meeting within a week of the ordinary one unless there was something very important to be dealt with. Accordingly, he attended that meeting, and he was very glad he did because it enabled him and some friends to fight against a motion which he would be very sorry to have been absent from voting on. He did not think, however, that this motion was intended to refer to the new *régime*.

Mr. Simpson: We had no special meetings lately except those in connection with the Bill.

Mr. Wells: But it is to hit at those three special meetings that the whole thing is.

The Vice-President said he would amend his motion so as to make it apply only to members residing "outside a radius of 20 miles from the city of Dublin."

The President said in any case the travelling expenses of the Vice-President should be paid.

The Vice-President said he would prefer that that suggestion should be withdrawn. He had in the past seen his way to coming to Dublin, and as long as he should continue to be Vice-President he hoped to come.

The Vice-President's motion as amended was then put and carried unanimously.

Mr. Wells read the following resolution, of which he had given notice:—

> "That we ask the Council of the Royal College of Surgeons of Ireland to reconsider their determination not to accept the certificates of licentiates of the Pharmaceutical Society of Ireland for practical pharmacy from candidates for their examination."

He read in the *Pharmaceutical Journal* a few weeks ago—and most of those present must have read also—that the above decision had been arrived at by the College of Surgeons. He also read the following:—"*The Medical Press and Circular* states that the regulation has been largely taken advantage of by certificate mongers who supply certificates for a nominal fee and without any real study. It is represented that a certificate of three months study of pharmacy can be had at ten minutes notice from certain well-known traders for 10*s*., and that the colleges had been obliged to take means to prevent evasion of the regulations in this way. Of course it will be understood that this applies to Ireland." On reading that he thought that as the representatives of the Pharmaceutical Chemists of Ireland they would not be doing their duty if they did not take steps in the matter. The charge made was a very grave one. They were all branded as being not fit to be trusted with giving certificates, because some persons granted them without the recipients having undergone proper training. But having talked the matter over with a member of the Society the latter said that what was stated in the extract he had read was perhaps not altogether the whole truth, and therefore with the leave of the Council he would substitute for the resolution which he had read the following one:—

> "That the Registrar be instructed to write to Greenwood Pim, Esq., M.A., asking if it is true that the Committee of the conjoint examinations of the Royal College of Surgeons and the King and Queen's College of Physicians have decided not to accept the certificates of licentiates of this Society for practical pharmacy from the candidates for their examinations."

It would be better, he thought, to ask those gentlemen for exact information on the subject; and then perhaps they would find that things were not as had been reported. He could himself bear out the statement that certificates could be had in Dublin for a consideration. As chemist of the City of Dublin Hospital, where he had to instruct students in pharmacy, young gentlemen had come to him on many occasions and asked his terms, and then disappeared altogether; and on making inquiry afterwards he easier was told that they could get their certificates uo terms elsewhere. He had heard of a young gentleman taking out a course of practical pharmacy who had never seen a mixture made up. These things showed that the colleges had some ground for complaint; but it seemed hard that the innocent should suffer.

Mr. Whitla said he had great pleasure in seconding Mr. Wells's resolution. He could bear out the statement that facilities existed for getting pharmacy certificates where the individual had never gone through any course. He himself was once asked to give for a consideration of £20 a certificate of three years' study

that would satisfy the requirements of the Pharmaceutical Society's examination.

The motion was put and unanimously carried.

The President reported that at the Preliminary examination twelve candidates had passed and seven had failed; and that at the examination for the licence seven candidates had passed out of sixteen.

Mr. Merrin said that as visitor at the examinations he saw that the majority of the candidates were unable to answer anything about the Poisons Act. Something about it should be put into the curriculum.

Mr. Simpson: The Act is in the beginning of the Poisons Book. They are bound to know it.

Mr. Merrin said he would give notice of a motion on the subject for the next meeting of the Council.

The President remarked that many candidates were not sufficiently acquainted with the Latin of prescriptions.

Mr. Merrin said he asked the Registrar for an examination paper, but was unable to get it. He was told that there was a rule of the Council that they should be withheld.

Mr. Wells said he considered that an illegal rule.

The Registrar said he did not refuse to let gentlemen see the examination papers; but his instructions were that when the papers were published in the Calendar he was to discontinue handing them out to anyone.

Mr. Wells: I can bear out what Mr. Ferrall says. I know there was a resolution passed about this, but I think it was an improper one.

A report from the Law Committee was adopted.

On the motion of Mr. Whitla, Messrs. Beggs and McCormack were appointed to serve on the Law Committee in the room of the President and Mr. Allen, resigned; and Mr. Beggs was appointed to serve on the Certificates Committee in the room of Mr. Allen, resigned.

Mr. Wells moved that Mr. John Evans be reappointed Examiner of the Society in practical pharmacy, reading and translating of prescriptions, and the British Pharmacopœia.

The Vice-President said it gave him great pleasure to second the motion. They all knew how well qualified Mr. Evans was for the office.

The motion was unanimously carried.

On the motion of the Vice-President, seconded by Mr. Wells, the following gentlemen were elected members of the Society:—Messrs. William Prott, Johnston Montgomery, James Tate, Andrew McNaught, George A. Webb, David W. Elliott, James R. Cochrane, John B. Robinson, Patrick J. Lyons, Isaac W. Nicholl and William C. Dobbin, all of Belfast; Mr. Huston Lancashire, Ballymena; Mr. James Walker, Ballynahinch; Mr. John B. Hay, Newtownards; and Mr. Solomon Donovan, Larne.

On the motion of Mr. Wells, seconded by Mr. Beggs, Mr. James N. Hardy, Dublin, was elected a member.

On the motion of Mr. Wells, seconded by Professor Tichborne, Mr. John Smith, Dublin, was elected a member.

The following gentlemen were nominated for the membership:—Proposed by Mr. Wells and seconded by the Vice-President—Messrs. John Simpson Robinson Rathmines, Dublin; Robert Jones, Cavan; Thomas D. Tate, Dublin; Robert J. Galwey, Dublin; Henry Conyngham, Dublin; and John J. Bernard, Bootersstown, Co. Dublin.

Proposed by the President and seconded by the Vice-President—Mr. Joseph J. McCawlay, Hollywood, Co. Down.

Proposed by Mr. Wells and seconded by the Vice-President—Messrs. Thomas J. English; Adam R. G. Clarke, Dublin; Richard Darley Atkinson, Dublin; John E. Connor, Newry; George Browne, Dublin; J. N. Harris, Sligo; and Bernard J. Castello, Dublin.

The Council then adjourned.

Proceedings of Societies in London.

ROYAL COLLEGE OF PHYSICIANS.

[CROONIAN LECTURE.]

RELATION BETWEEN CHEMICAL STRUCTURE AND PHYSIOLOGICAL ACTION.

BY T. LAUDER BRUNTON, M.D., F.R.S.

(*Concluded from page* 96.)

Necessity of Investigation of the Action of Simple Drugs on Simple Tissues.—It is only by a thorough knowledge of the conditions which cause bodies of simple chemical structure, like caffeine or xanthine, sometimes to produce contraction and sometimes elongation of muscle, that we can hope to treat cardiac disease with certainty, either by means of these substances or by more complex cardiac tonics. The only indication that we have of life is motion, either of the body as a whole or its parts, as in the movements of the respiration or pulse, or of the blood in the test for life I have already mentioned, or in secretion, as in the case of glands kept alive by artificial circulation. In order to understand thoroughly the effect of any drug we must know what its action is upon muscular fibre, and the variations produced in its action by changes in the temperature or reaction. But muscular fibres are usually stimulated to contraction or to relaxation by efferent nerves, and they are again excited by the nerve centres from which they proceed. Unless we know the action of drugs on nerves, as well as on muscles, we cannot rightly estimate their action upon nerve centres. It is on this account that Cash and I have not only taken up the study of comparatively simple drugs, such as ammonia, compound ammonias, alkalis, earths, and the simpler aromatic compounds; but we have worked more especially at the action of those substances on muscle and motor nerves, hoping in this way to lay a foundation for future researches on higher structures and more complex drugs.

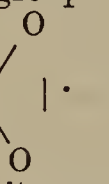
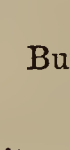
Modifications in the Action of Drugs.—The action of drugs upon voluntary muscle is not always alike. It may be different in frogs and mammals, nay, more, it may differ in two species of frogs. It may be different in voluntary and involuntary muscle, and the involuntary muscular fibre of the heart may not react in quite the same way as that of the vessels, and the intestines may differ from both. Yet a general likeness can usually be discerned between the action of a drug on all kinds of muscular fibre, and it is precisely the fact that differences exist which will give us most assistance in treatment, after we have once learned the causes of these differences. Caffeine usually, as I have said, contracts the muscles of the frog's legs, but sometimes it elongates them, and the same difference in its action is observed in the heart. Generally the heart stops in systole, but sometimes it stops in full diastole. In this respect the action of caffeine resembles that of digitalis.*

Complexity of the Heart.—In the heart we are not dealing with muscular fibre only, but with nerves and ganglia as well, and the effect of any drug upon this organ is the resultant of its action, not only upon all these structures in the heart, but upon the medulla as well. Moreover, when we are dealing with the heart in connection with the blood vessels the action becomes still more complex, for contraction or relaxation of the vessels will alter the resistance which the heart has to overcome. The problems we have to solve in looking for new cardiac tonics are, therefore, far from easy, but we may hope that patient investigation will solve them, and that we may ere long aid the sufferers from cardiac disease more efficiently than we can at present.

* C. Lauder Brunton, 'On Digitalis,' pp. 96, 105. London, Churchill, 1868.

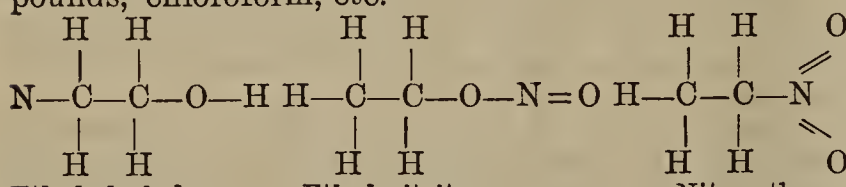
Direction in which to Look for Cardiac Tonics.—I have already pointed out that most drugs belonging to the class of cardiac tonics are also local anæsthetics, but all local anæsthetics do not appear to be cardiac tonics. Nevertheless, by looking through the class of local anæsthetics we may perhaps find some new cardiac tonics, and, at any rate, it is worth while to try.

ACTION OF DRUGS ON THE BLOOD VESSELS.

Our knowledge of the chemical nature of drugs which dilate the blood vessels is somewhat greater than of those that contract them, for the agents which cause dilatation most markedly are of very simple chemical structure. They are, in fact, nitrites, or substances which yield nitrous acid in the blood, but all nitrates have not an equally powerful action, and the efficiency of the NO_2 depends to a great extent on the radical with which it is combined, and the mode in which this combination occurs. For the group NO_2 may be arranged thus: —O—N=O, or  In each of these the nitrogen is trivalent. But it may be quinquevalent, in which case the group would be In nitrous compounds, it is probably O=N—O—, while in nitric compounds it is probably  But in nitrous compounds we have two classes: nitroso and iso-nitroso. We thus see that there may be considerable differences in the NO_2 groups, and the action of this group is determined to a considerable extent by the alkyl to which it is joined and the manner in which the joining takes place.

Nitrites of Methyl, etc.—When we have the junction taking place through oxygen, the group NO replacing hydrogen in alcohol, we obtain the nitrites of methyl, ethyl, propyl, butyl, amyl, and so on; but when we have the nitrogen directly united to carbon by one affinity, the group NO_2 replacing hydrogen in methane, we get the nitro compounds, nitro-methane, nitro-ethane, nitro-propane, nitro-butane, nitro-pentane.

Action of Nitro-methane, etc.—These nitro compounds appear to have less action on the vessels than the nitrites, and do not cause the same marked dilatation in them or consequent fall of blood pressure. They tend rather to produce narcosis, like the haloid compounds, chloroform, etc.



Ethyl alcohol. Ethyl nitrite. Nitro-ethane.

Amyl Nitrite.—Amyl nitrite has a rapid action, quickly occurring and quickly passing off, and since I first used it for angina pectoris in 1867 its utility in the treatment of this disease has become almost universally recognized.

Other Nitrites.—While working in Ludwig's laboratory in 1869 on the action of this drug, I satisfied myself that other nitrites, and especially that sodium nitrite, had a similar action. In 1876, Dr. Gresswell and I made some experiments, which we have not published, although a preliminary note appeared of them at the time. From these experiments it appeared that amyl nitrite had a more marked action than ethyl nitrite, but the next in the series, capryl nitrate, was less active than amyl. Recently the subject has again been taken up, and Cash and Dunstan have found that butyl nitrite is still more powerful than amyl, but the question now arises, which butyl or amyl is it whose combination with NO_2 is most efficacious, that is to say, which acts most quickly and most powerfully.

Tertiary Amyl Nitrite.—According to Bertoni the nitrite obtained from tertiary amyl alcohol or ethyl-dimethyl-carbinol acts more powerfully and for a longer time than ordinary amyl-nitrite. My assistants have tested it for me, and laboratory experiments showed that in animals, while it caused fall of blood pressure, it also produced vomiting. In one middle-aged patient suffering from angina pectoris it was not so efficacious as ordinary nitrite, and in him it produced vomiting; but in an old man it produced no vomiting, and gave more relief than other nitrites. It is possible that there may be a difference in the effect of the different nitrites in consequence of greater or less rigidity of the vascular walls. It is possible that where the vessels are not rigid ordinary amyl nitirte or iso-butyl nitrite may be best, but when the vessels are rigid a more prolonged action may be desirable, and in these nitroglycerine and Bertoni's nitrite may be preferable.

Bright's Disease.—But there are other cases in which prolonged dilatation of the vessels is very desirable. First, in cases where the heart is weak and barely able to carry on the circulation; secondly, where the tension from the vessels is very high, and there is danger of rupture, as in cases of Bright's disease. In both of these it is highly probable that we may obtain better results with the nitrites of some of the higher alkyls than with any that have yet been employed. A series of experiments is also desirable on the action of nitro-butane, nitro-pentane, and other nitro compounds in these cases.

ACTION OF DRUGS UPON THE BLOOD.

In addition to the power to dilate the vessels, nitrites have a very marked action upon the blood. When mixed with it they cause it to become of a chocolate colour, and they produce a similar change in it while it is still contained in the vessels of animals poisoned by nitrites. As Gamgee showed, nitrites, as it were, lock up oxygen in the hæmoglobin, so that blood which has been acted upon by them will not either take up or give off oxygen so readily as normal blood, but strong reducing agents will remove the oxygen, and then the reduced blood will combine with oxygen readily again. On this account nitrites do not arrest the respiration in the tissues in the same way as carbonic oxide, for when they have brought the animal to the verge of suffocation by locking up the oxygen in oxyhæmoglobin, the nitrous compound becomes reduced, and the hæmoglobin then resumes its normal functions. A few inhalations of the nitrites, such as amyl nitrite, may thus produce asphyxial convulsions, but the animal recovers quickly and certainly, unless the inhalation be maintained. The nitrite appears to behave to the oxygen of the blood corpuscles in somewhat the same way as the stopper of a bottle does to the liquid it contains, preventing anything from going out or into the bottle, but when sufficient force is applied to withdraw it, it no longer interferes with either exit or entrance. A similar effect is produced by nitroglycerine and also by hydroxylamine. Nitrites must almost necessarily interfere with oxidation of the blood, and probably it is on this account that they give rise to the appearance of sugar in the urine. Nitrites, notwithstanding their marked effect upon hæmoglobin, do not destroy blood corpuscles, and consequently do not give rise to the presence of hæmoglobin in the urine; but a number of substances, more especially those belonging to the aromatic group, like toluylene-diamine, have this power, and an in-

teresting question arises how far paroxysmal hæmoglobinuria may not really be a form of poisoning, due to the absorption of poisonous compounds of the aromatic series, and pernicious anæmia has been attributed by Sandoz* to poisoning by substances formed in the intestine and absorbed from it.

ACTION OF DRUGS ON THE LIVER.

For a long time the liver, notwithstanding its great size and its remarkable position, was regarded as having little functional importance, and was supposed merely to excrete bile, a fluid which plays quite a minor part in the digestive processes. But for some years back the liver has been gradually increasing in importance, and its functions are now recognized to be various in kind as well as most necessary to the organism.

Bile only a Bye-Product although a Useful One.—The coal-tar refuse of gas works is now utilized, at least in large towns, but even in small places gas continues to be made, although the coal tar produced in the process cannot be worked up, and remains simply as refuse. In the same way the bile is certainly useful in the digestive process, preventing the decomposition, accelerating peristalsis, and aiding the pancreatic juice to digest fats. But still it is, after all, to be regarded as a bye-product of hepatic activity.

Dangers to Life.—The knowledge which we have gained during the last few years regarding the poisonous properties of some albuminous substances, and of the products which albumen yields when decomposed, makes it, as Mr. Darwin said, a wonder that we are all alive, considering how many poisonous substances are constantly formed in the intestine.

The Liver as a Gatekeeper.—Indeed, one can hardly see how life would continue long were it not that the liver has a position and function like the gatekeeper or porter of a town or castle in times of war, inspecting all comers and turning back those that are dangerous. It possesses a twofold power to prevent poisons entering the portal vein from passing into the general circulation, for it turns back some and destroys others. Some of them, such as lead, copper, mercury, and iron, are simply arrested by it, and instead of passing into the general circulation are excreted by the bile, and finally ejected from the body. Some organic poisons, such as curara, appear also to be partly excreted in the same way. But the liver appears to have not only the power of excreting poisons, but of actually destroying them, or, at any rate, converting them into non-poisonous compounds. Thus double the quantity of strychnine, veratrine, quinine, and morphine are required to kill an animal, if injected into the portal vein, as would be sufficient if injected into the jugular vein, while no less than three times the quantity of curara is requisite.† The liver exerts a similar power over peptones and ptomaines, as well as over compounds of ammonia with weak acids, such as ammonium acetate, but chloride of ammonium is unaffected.

Use of Glycogen in Regard to Poisons.—Organic poisons appear to have their activity lessened in the liver by combination with glycogen, for when animals are made to fast, the power of the liver to destroy the toxic action of poisons gradually diminishes as the glycogen disappears. In cases where ptomaines are found in quantity in the intestine, Roger recommends such food to be given as will quickly supply glycogen, such as milk. He explain the usefulness of milk in uræmic poisoning in this way, while beef-tea in such cases simply increases the poison. It is possible that the peculiar symptoms of tremor, faintness, and even mental weakness which occur in some patients, when fasting, and which are rapidly relieved by food, may be, in some degree, due to the ptomaines formed in the intestines, and the relief by food may be explained by their destruction by the increased activity of the liver. At the same time we must remember that ptomaines—or, perhaps, we ought rather to say leucomaines—are formed in the tissues generally, and that an increase of glycogen in the blood may combine with poisonous products in the nerves and muscles, preventing them from exerting a poisonous action, and thus removing weakness, languor or tremor due to them. The whole of this subject presents a fruitful field for further inquiry, and at present our knowledge is little more than sufficient to indicate how much there yet remains to be known.

* Sandoz, 'Corr. Bl. f. Schweiz. Aerzte,' 1887.
† Roger, 'Action du Foie sur les Poisons.'

GLYCOGENIC FUNCTION OF THE LIVER.

Another most important function of the liver is that of forming glycogen. It does this both from proteids and from carbohydrates, and thus acts, one might say, as the coal bunker of the body, storing up a reserve of nutriment to be utilized during the hours of fasting. But here again we meet with a curious action of some drugs.

Action of Ammonia.—Ammonia, as I have mentioned, is a poison, and so is ammonium carbonate if injected into the jugular vein, but the poisonous activity of these substances is greatly diminished when they are injected into the portal vein. But this is not all. The liver actually converts these poisons into food, and when they are given to an animal, along with a non-nitrogenous diet, they increase the quantity of glycogen in the liver, and ultimately pass out in the form of urea, just as albumen would have done. Some amido-compounds, such as asparagine and glycocoll, have a similar action, but this is not shared by all the amido substances, for beef-tea, and Liebig's extract, contain a number of these, and yet neither seems to act in the same way as ammonia.*

Removal of Glycogen from the Liver.—Notwithstanding all the labour that has been expended in investigating the glycogenic function of the liver, it cannot be said that we clearly understand, even yet, the way in which glycogen is formed in the liver, or the way in which it disappears from it. Probably, a good deal of it is carried off by the blood in the form of sugar, and some also in the form of glycogen.

Action of Poisons upon Glycogen.—We have already seen that glycogen unites with some poisons, such as morphine, and with peptones, or other poisonous products of albuminous decompositions, so as to alter their properties and lessen their poisonous activity. We might therefore expect the converse to be the case, and look for them to exert an action upon glycogen, and perhaps render it less easily decomposed. We can readily understand on this supposition how the addition of a single egg, or piece of cheese, to a meal of bread and butter will increase its staying power, so that a person will be able with this slight addition, to go on for four or five hours, instead of wanting another meal at the end of two. It would also explain the action of morphine in cases of diabetes. As Claud Bernard found that reflex dilatation of the hepatic artery would increase the transformation of sugar in the liver and induce diabetes, one was inclined to attribute the beneficial action of morphine or codeine to their sedative action on the nerve centres, preventing any irritation which might exist from affecting the hepatic vessels. But Mitchell Bruce has clearly shown that this is not the case, and that we must look to a direct action of morphine upon the liver itself for an explanation of its utility in diabetes.

Glycosuria caused by Drugs.—There are a number of substances which will produce temporary glycosuria. Many of these are supposed to act by dilating the hepatic artery; for example, amylnitrite, curara, ortho-

* Paul Bahlmann, 'Inaug. Diss.' Erlangen, 1885

nitro-propionic acid, and methyl delphinine, chloroform, chloral hydrate, alcohol, and hydrocyanic acid, It is not improbable, however, that some of these, at least, may cause sugar to appear, by lessening the normal processes of oxidation, by which it ought to be converted into carbonic acid. For carbonic oxide is a most powerful agent in producing glycosuria, and amyl nitrite, alcohol, and chloroform all tend to lessen oxidation. The most remarkable substance in producing glycosuria seems however to be phlorizin.* This substance, which is obtained from the root bark of apple trees, appears to have the power of preventing the organism from oxidizing or otherwise utilizing sugar. When dogs are kept without food for several days, but receive phlorizin all the time, the whole of the glycogen disappears both from the liver and the muscles; but if they are still kept without food, quantities of sugar appear in the urine, which can only be produced, so far as one can see, from the breaking up of the albuminous tissues of the body. In birds phlorizin causes glycosuria even after the liver has been extirpated.† Arsenic, antimony and phosphorus all cause the glycogen to disappear from the liver,‡ but they produce at the same time fatty degeneration, whereas phlorizin appears simply to cause a general shrinking of the liver.§

Amount of Bile as an Index to Functional Activity in the Liver.—The secretion of bile, although it has attracted more attention than the other functions of the liver, is in itself of minor importance. But just as a stranger visiting a gas factory in the country, where they could not use up their waste products, might judge by the amount of tar he saw about whether they had been making much gas or not, so from the secretion of bile we may draw important conclusions regarding another very important function of the liver, namely, its power to destroy blood corpuscles. Life appears to consist of a continual process of destruction and repair, and the blood forms no exception to the rule. Its vitality appears to be maintained by constant formation and destruction of blood corpuscles. Whether the corpuscles be actually broken up in the spleen, and their fragments carried to the liver, or whether they be destroyed in the liver itself does not at present concern us.

Relation between Blood-pigment and Bile-pigment.—At all events it is in the liver, or rather perhaps we should say in the bile, that we find the remains of one of their most important constituents, hæmoglobin. Since Virchow pointed out the relationship between hæmatoidin and bile pigment, numerous researches have been made, to show that hæmoglobin could be converted into bilirubin.

Hæmoglobinuria and Jaundice.—Thus Kühne found that bile pigments appeared in the urine after the injection of hæmoglobin into the blood, and the same result has been observed after intravenous injection of substances which will dissolve corpuscles in the vessels, such as bile acids, large quantities of water, ether, chloroform and phosphoric acid. In trying to repeat some of these experiments, many years ago, I obtained a negative result, and other observers have also failed. In place of bile pigment I found hæmoglobin, and others have done the same, but Städeleman has cleared up the discrepancies. In his researches on toluylene-diamine, he found that in some animals he obtained hæmoglobinuria, and in others jaundice. This jaundice was due to the fact that the bile ducts became plugged by bile so thick that it would not flow along an ordinary test tube, and much less through the hepatic ducts. The mode of action of the poison with which he experimented, as well as of chloroform, water, or bile acids injected into the circulation, seems to be as follows:—They break up the blood-corpuscles, liberating hæmoglobin. This is carried by the blood to the kidneys and liver as well as to the other organs. In the kidneys it is partly excreted, giving rise to hæmoglobinuria. In the liver it is taken up by the hepatic cells and converted into bile pigment.

Hæmatogenous Jaundice.—At first the whole quantity of bile is increased, solids as well as liquids, so that toluylene-diamine may be looked upon as a most powerful hepatic stimulant. Soon, however, the solids increase out of proportion to the fluid in the bile. It becomes thicker and thicker, until it will no longer flow along the ducts, and then a part of it being absorbed from the biliary capillaries, jaundice is produced. These researches show that although all jaundice may be looked upon as of hepatic origin yet the function of the liver is so much affected by the nature of the blood, that jaundice may occur in consequence of the destruction of red blood-corpuscles, and the name of "hæmatogenous," as applied to such a form of jaundice, may therefore be justified.

Jaundice from Poisons.—One of the oldest observations on jaundice of this sort is probably that of Galen, that the skin becomes yellow in some persons after the bite of a viper. This is particularly interesting in relation to the possible causation of epidemic jaundice, or even of so-called catarrhal jaundice, in those cases where the catarrh is supposed to affect the bile ducts only, and there is no evidence of its extension to the intestine or stomach. The venom of poisonous snakes, both viperine and colubrine, paralyses both motor nerves and nerve centres, but the viperine poison differs from the colubrine in its effects upon the blood, which it deprives of its coagulating power, while at the same time it tends to destroy the red corpuscles. The researches of Weir Mitchell, Reichart, Martin and Wolfenden have shown that the poisonous substance in snake poison is not an acid or an alkaloid, but an albumose similar in its chemical reactions to the products of the ordinary digestion of albuminous foods in the stomach or intestine. It is only within the last few years that the poisonous properties of albumoses have been recognized, but poisons belonging to this class are now found to be pretty widely distributed.

Poisonous Blood in Fishes.—They occur, according to Martin, in the jequirity or abrus seed, and Mosso has recently found the blood of lampreys and hag fishes, and Springfield that of eels, to be poisonous from albumoses which it contains. The poisonous properties of albumoses are destroyed by boiling, and usually also by the simple process of digestion; but if they should be taken in large quantity into the stomach they might be able to pass through the liver in sufficient quantity to prove injurious, and, if this be so, one can just understand why Henry I. of England should have died after eating lampreys to excess.

Epidemic and Catarrhal Jaundice.—At present we are quite ignorant of the pathology of epidemic jaundice, or of those cases of catarrhal jaundice where yellowness is the only symptom, and it seems not improbable that both of these may be due to poisons of some sort absorbed from the intestine. I know of one case at least in which jaundice of this sort came on after eating ham which appeared to be tainted.

Acute Red Atrophy of the Liver.—In another case, which I saw only a few months ago, sudden illness came on a few hours after eating ham. I diagnosed the case as one of poisoning by ptomaines. Death occurred in a few days, and the *post-mortem* examination showed nothing to account for death, excepting the liver, which was in a condition of red atrophy.

* Von Mering, *Verh. d. h. Congress. fur. inn. Med.*, 1887.

† Minkowski and Thiel, *Arch. f. exp. Path. u. Pharm.*, Bd. 23, p. 142.

‡ Salkowsky, *Virchow's Arch.* 34, p. 78.

§ Ueber d. Einfluss v. Giften a. d. Grösse d. Leberzellen, A. Neumann, *Inaug. Diss.* Berlin, 1888.

This also is a disease of whose pathology we are ignorant, and further researches must decide whether or not it may really be simply due to the effect of poisons on the organ.

NEW REMEDIES IN DISORDERS OF THE LIVER.

But an extended knowledge of pathology is not the only gain we may hope for from a thorough investigation of the action of drugs upon the liver; we may reasonably expect great additions to our power of treating its functional disorders or even organic diseases. I have already mentioned the peculiar effect of ammonium salts upon the glycogenic function. Dr. Stewart's introduction of chloride of ammonium in hepatic abscess is a most important aid in the treatment of that disease. The biliary function appears to be modified in a remarkable way by many substances of the aromatic series which greatly increase the bile. It is a very remarkable thing that a great number of the ptomaines belong to the class of compound ammonias or amines, and the remarkable action of toluylene-diamine appeared to me to indicate the necessity for ascertaining if possible what effect would be produced on the liver by bodies of the aromatic series, free from nitrogen, as compared with the effect of similar bodies combined with ammonia. At my suggestion Dr. Collins made a number of experiments with toluene and toluylene-diamine in my laboratory, and found that both these substances greatly increased the flow of bile. Not feeling quite certain what effect toluylene-diamine and allied bodies might have upon patients, I felt a little chary of using them until I should obtain a fuller knowledge of their mode of action. In order to be ready, however, to use them as soon as I had acquired sufficient knowledge, I asked Messrs. Burroughs and Wellcome to prepare me some tabloids and capsules containing toluene and toluylene-diamine. This they kindly did, and a gentleman to whom Dr. Collins had mentioned the existence and probable use of the tabloids tried them upon his patients with good success, as he informs me.

Vegetable Cholagogues.—Most of the vegetable hepatic stimulants, iridin, euonymin, and aloes, belong to the aromatic series, although we do not know their chemical structure. Much benefit is frequently obtained by their use in so-called "biliousness," and we may reasonably expect that a full knowledge of the mode of action and chemical structure of the vegetable cholagogues will enable us, not only to apply them more judiciously, but to modify their structure, and consequently their action in various directions, to suit our wants. It is almost certain, also, that we shall obtain a very large series of new bodies which may act upon the liver, either as stimulants or as depressants, increasing or diminishing the formation of bile, and affecting the other functions of the organ, which I have already mentioned. The frequency with which functional hepatic disorder occurs, and the great discomfort which it occasions, not only to the sufferer, but to his friends, and even to the community at large, renders it most desirable that efficient modes of treatment should be discovered.

METHODS OF SEARCHING FOR NEW HEPATIC REMEDIES.

The search after new remedies has hitherto been conducted almost entirely in two ways: first, by the administration of drugs to patients, and a chemical analysis of the liver itself so as to ascertain whether the amount of glycogen and fat has been altered by the drug. According to Ellenberger and Baum, who experimented on horses, the hepatic cell when in action is larger, has a sharper contour, has a net-like arrangement of its protoplasm, and contains more granules which stain with eosin, and fewer pigment granules than the cell when at rest. This active condition of the cell occurs during digestion, but it may be produced independently of digestion by such drugs as pilocarpine, muscarine and aloes. A similar but less powerful action is exerted by salicylate and benzoate of soda and by rhubarb. On the other hand, atropine arrests the activity of the liver, so that the hepatic cells appear to be completely at rest, even in the very middle of the digestive process. A similar but less powerful action is exerted by ammonium chloride, sulphate of magnesia and calomel. Copper and lead also arrest the hepatic activity, but when they are given for a time they produce fatty degeneration of the cells and accumulation of bile in them. The action of a very large number of substances on the liver cells has been investigated by Alfred Neumann under Ehrlich's direction; and many belonging to the aromatic series have been found to produce enlargement of the hepatic cells. Amongst these are cocaine, coumarin, acetophenone, azobenzine, dibromazobenzene, dimethylparaphenylandiamine sulphate, martius yellow, orthonitrophenylpropionic acid, paraoxybenzaldehyde, paratoluidin, phenanthroquinone, and phenylthiourea.

Dr. Sheridan Delépine has kindly examined for me the changes which the hepatic cells in the rabbit undergo under the action of atropine, pilocarpine and toluene. It was found that the effect of atropine and pilocarpine on the liver of the rabbit resembles that which Ellenberger and Baum have described as occurring in the horse.

The effect of toluene is very peculiar. The outline of the cells becomes sharp, but the cells become small and the blood vessels large, so that the liver is congested. The bile also appears to be expelled from the liver, for the blood corpuscles in the vessels are not destroyed, while they usually are dissolved by the bile.

This subject is one of the greatest possible practical interest, because its investigation may explain the causation of those very common and very troublesome symptoms to which the term "biliousness" is commonly given, and which are usually ascribed to a "torpid liver." Experiments on the effects of nitrogenous and non-nitrogenous foods on the liver cells are required in order to give us a firm physiological basis; and then a study of the action of various substances belonging to the aromatic and ammoniacal groups may enable us to discover what products of albuminous decomposition on the intestine lead to hepatic congestion, "torpid liver," and "biliousness." At the same time we may hope that such an investigation will also enable us to find efficient remedies for these conditions. At all events, I think it is evident that the whole subject of hepatic stimulants must be studied anew, not by the older method of trying to ascertain their action on the organ as a whole, but rather on the cells which compose it. As I mentioned in my first lecture, the latest development of pharmacology is the "pharmacology of the cell;" and to it we must look for the fullest information regarding the action of remedies, whatever be the class to which they belong.

Time will not allow me to enter upon the relations between the chemical structure of remedies and their action upon other glands than the liver, and especially upon the kidneys. Nor can I even flatter myself that I have treated any part of my subject fully. All I have done is to attempt to give a brief outline of it, not discussing it with a view to completeness, nor always bringing prominently forward those points which would be most interesting to a chemist, but rather endeavouring to bear in mind the practical intention of these lectures, and to show as much as possible the relationship of my subject to the prevention, control, and cure of disease. In trying to do this, I have thought it advisable to look forward as well as

backward, and to indicate lines of research on which work is desirable, even at the expense of time which might have been given to a fuller exposition of results already obtained. In conclusion, I must again return you my most cordial thanks, not only for the honour you have done me in selecting me to give these lectures, but for the patient and kindly hearing you have given them.

ROYAL INSTITUTION OF GREAT BRITAIN.

An Attempt to Apply to Chemistry one of the Principles of Newton's Natural Philosophy.*

BY D. MENDELÉEFF, LL.D.

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Nature, inert to the eyes of the ancients, has been revealed to us as full of life and activity. The conviction that motion pervaded all things, which was first realized with respect to the stellar universe, has now extended to the unseen world of atoms. No sooner had the human understanding denied to the earth a fixed position and launched it along its path in space, than it was sought to fix immovably the sun and the stars. But astronomy has demonstrated that the sun moves with unswerving regularity through the star-set universe at the rate of about 50 kilometres per second. Among the so-called fixed stars are now discerned manifold changes and various orders of movement. Light, heat, electricity—like sound—have been proved to be modes of motion; to the realisation of this fact modern science is indebted for powers which have been used with such brilliant success, and which have been expounded so clearly at this lecture table by Faraday and by his successors. As in the imagination of Dante, the invisible air became peopled with spiritual beings, so before the eyes of earnest investigators, and especially before those of Clerk Maxwell, the invisible mass of gases became peopled with particles; their rapid movements, their collisions, and impacts became so manifest that it seemed almost possible to count the impacts and determine many of the peculiarities or laws of their collisions. The fact of the existence of these invisible motions may at once be made apparent by demonstrating the difference in the rate of diffusion through porous bodies of the light and rapidly moving atoms of hydrogen and the heavier and more sluggish particles of air. Within the masses of liquid and of solid bodies we have been forced to acknowledge the existence of persistent though limited motion of their ultimate particles, for otherwise it would be impossible to explain, for example, the celebrated experiments of Graham on diffusion through liquid and colloidal substances. If there were, in our times, no belief in the molecular motion in solid bodies, could the famous Spring have hoped to attain any result by mixing carefully dried powders of potash saltpetre and acetate of soda, in order to produce by pressure a chemical reaction between these substances through the interchange of their metals, and have derived, for the conviction of the incredulous, a mixture of two hygroscopic though solid salts—nitrate of soda and acetate of potash?

In these invisible and apparently chaotic movements, reaching from the stars to the minutest atoms, there reigns, however, a harmonious order which is commonly mistaken for complete rest, but which is really a consequence of the conservation of that dynamic equilibrium which was first discerned by the genius of Newton, and which has been traced by his successors in the detailed analysis of the particular consequences of the great generalization, namely, relative immovability in the midst of universal and active movement.

* Delivered Friday, May 31.

But the unseen world of chemical changes is closely analogous to the visible world of the heavenly bodies, since our atoms form distinct portions of an invisible world, as planets, satellites, and comets form distinct portions of the astronomer's universe. Our atoms may therefore be compared to the solar systems or to the systems of double or of single stars. For example, ammonia (NH^3) may be represented in the simplest manner by supposing the sun nitrogen surrounded by its planets of hydrogen; and common salt (NaCl) may be looked upon as a double star formed of nitrogen and chlorine. Besides, now that the indestructibility of the elements has been acknowledged, chemical changes cannot otherwise be explained than as changes of motion, and the production by chemical reactions, of galvanic currents, of light, of heat, of pressure, or of steam power, demonstrates visibly that the processes of chemical reaction are inevitably connected with enormous though unseen displacements, originating in the movements of atoms in molecules. Astronomers and natural philosophers, in studying the visible motions of the heavenly bodies and of matter on the earth, have understood and have estimated the value of this store of energy. But the chemist has had to pursue a contrary course. Observing in the physical and mechanical phenomena which accompany chemical reactions the quantity of energy manifested by the atoms and molecules, he is constrained to acknowledge that within the molecules there exists atoms in motion, endowed with an energy which, like matter itself, is neither being created nor is capable of being destroyed. Therefore, in chemistry, we must seek dynamic equilibrium not only between the molecules but also in their midst among their component atoms. Many conditions of such equilibrium have been determined, but much remains to be done, and it is not uncommon, even in these days, to find that some chemists forget that there is a possibility of motion in the interior of molecules, and therefore represent them as being in a condition of death-like inactivity.

Chemical combinations take place with so much ease and rapidity; possess so many special characteristics, and are so numerous, that their simplicity and order was for a long time hid from investigators. Sympathy, relationship, all the caprices or all the fancifulness of human intercourse, seemed to have found complete analogies in chemical combinations, but with this difference, that the characteristics of the material substances—such as silver, for example, or of any other body—remain unchanged in every subdivision from the largest masses to the smallest particles, and consequently their characteristics must be a property of its particles. But the world of heavenly luminaries appeared equally fanciful at man's first acquaintance with it, so much so that the astrologers imagined a connection between the individualities of men and the conjunction of planets. Thanks to the genius of Lavoisier and of Dalton, man has been able, in the unseen world of chemical combinations, to recognise laws of the same simple order as those which Copernicus and Kepler proved to exist in the planetary universe. Man discovered, and continues every hour to discover, *what* remains unchanged in chemical evolution, and *how* changes take place in combinations of the unchangeable. He has learned to predict, not only what possible combinations may take place, but also the very existence of atoms of unknown elementary bodies, and has besides succeeded in making innumerable practical applications of his knowledge to the great advantage of his race, and has accomplished this notwithstanding that notions of sympathy and affinity still preserve a strong vitality in science. At present we cannot apply Newton's principles to chemistry, because the soil is only being now prepared. The invisible world of chemical atoms is still waiting for the creator of chemical mechanics. For him our

age is collecting a mass of materials, the inductions of well-digested facts, and many-sided inferences similar to those which existed for astronomy and mechanics in the days of Newton. It is well also to remember that Newton devoted much time to chemical experiments, and while considering questions of celestial mechanics, persistently kept in view the mutual action of those infinitely small worlds which are concerned in chemical evolutions. For this reason, and also to maintain the unity of laws, it seems to me that we must, in the first instance, seek to harmonize the various phases of contemporary chemical theories with the immortal principles of the Newtonian natural philosophy, and so hasten the advent of true chemical mechanics. Let the above considerations serve as my justification for the attempt which I propose to make to act as a champion of the universality of the Newtonian principles, which I believe are competent to embrace every phenomenon in the universe, from the rotation of the fixed stars to the interchanges of chemical atoms.

In the first place I consider it indispensable to bear in mind that, up to quite recent times, only a one sided affinity has been recognized in chemical reactions. Thus, for example, from the circumstance that red-hot iron decomposes water with the evolution of hydrogen, it was concluded that oxygen had a greater affinity for iron than for hydrogen. But hydrogen, in presence of red-hot iron scale, appropriates its oxygen and forms water, whence an exactly opposite conclusion may be formed.

During the last ten years a gradual, scarcely perceptible, but most important change has taken place in the views, and consequently in the researches of chemists. They have sought everywhere, and have always found systems of conservation of dynamic equilibrium substantially similar to those which natural philosophers have long since discovered in the visible world, and in virtue of which the position of the heavenly bodies in the universe is determined. There where one-sided affinities only were at first detected, not only secondary or lateral ones have been found, but even those which are diametrically opposite; yet, among these, dynamical equilibrium establishes itself not by excluding one or other of the forces, but regulating them all. So the chemist finds in the flame of the blast furnace, in the formation of every salt, and, with especial clearness, in double salts, and in the crystallization of solutions, not a fight ending in the victory of one side, as used to be supposed, but the conjunction of forces; the peace of dynamic equilibrium resulting from the action of many forces and affinities. Carbonaceous matters, for example, burn at the expense of the oxygen of the air, yielding a quantity of heat and forming products of combustion, in which it was thought that the affinities of the oxygen with the combustible elements were satisfied. But it appeared that the heat of combustion was competent to decompose these products, to dissociate the oxygen from the combustible elements, and, therefore, to explain combustion fully, it is necessary to take into account the equilibrium between opposite reactions, between those which evolve, and those which absorb heat.

In the same way, in the case of the solution of common salt in water, it is necessary to take into account, on the one hand, the formation of compound particles generated by the combination of salt with water, and on the other the disintegration or scattering of the new particles formed, as well as of those originally contained. At present we find two currents of thought, apparently antagonistic to each other, dominating the study of solutions: according to the one, solution seems a mere act of building up or association; according to the other, it is only dissociation or disintegration. The truth lies evidently between these views; it lies, as I have endeavoured to prove by my investigations into aqueous solutions, in the dynamic equilibrium of particles tending to combine and also to fall asunder. The large majority of chemical reactions which appeared to act victoriously along one line have been proved capable of acting as victoriously even along an exactly opposite line. Elements which utterly decline to combine directly may often be formed into comparatively stable compounds by indirect means, as for example in the case of chlorine and carbon; and consequently the sympathies and antipathies, which it was thought to transfer from human relations to those of atoms, should be laid aside until the mechanism of chemical relations is explained. Let us remember, however, that chlorine, which does not form with carbon the chloride of carbon, is strongly absorbed, or as it were dissolved by carbon, which leads us to suspect incipient chemical action even in an external and purely surface contact, and involuntarily gives rise to conceptions of that unity of the forces of nature which has been so energetically insisted on by Sir William Grove and formulated in his famous paradox. Grove noticed that platinum, when fused in the oxyhydrogen flame, during which operation water is formed, when allowed to drop into water decomposes the latter and produces the explosive oxyhydrogen mixture. The explanation of the paradox, as of many others which arose during the period of chemical renaissance has led, in our time, to the promulgation by Henri St. Claire Deville of the conception of dissociation and of equilibrium, and has recalled the teaching of Berthollet, which, notwithstanding its brilliant confirmation by Heinrich Rose and Dr. Gladstone, had not, up to that period, been included in received chemical views.

Chemical equilibrium in general, and dissociation in particular, are now being so fully worked out in detail, and applied in such various ways, that I do not allude to them to develope, but only use them as examples by which to indicate the correctness of a tendency to regard chemical combinations from points of view differing from those expressed by the term hitherto appropriated to define chemical forces, namely, "affinity." Chemical equilibria, dissociation, the speed of chemical reactions, thermo-chemistry, spectroscopy, and, more than all, the determination of the influence of masses and the search for a connection between the properties and weights of atoms and molecules; in one word, the vast mass of the most important chemical researches of the present day, clearly indicates the near approach of the time when chemical doctrines will submit fully and completely to the doctrine which was first announced in the Principia of Newton.

In order that the application of these principles may bear fruit it is evidently insufficient to assume that statical equilibrium reigns alone in chemical systems or chemical molecules; it is necessary to grasp the conditions of possible states of dynamical equilibria, and to apply to them kinetic principles. Numerous considerations compel us to renounce the idea of statical equilibrium in molecules, and the recent yet strongly supported appeals to dynamic principles constitute, in my opinion, the foundation of the modern teaching relating to atomicity, or the valency of the elements, which usually forms the basis of investigations into organic or carbon compounds.

This teaching has led to brilliant explanations of very many chemical relations and to cases of isomerism, or the difference in the properties of substances having the same composition. It has been so fruitful in its many applications and in the foreshadowing of remote consequences, especially respecting carbon compounds, that it is impossible to deny its claims to be ranked as a greater achievement of chemical science. Its practical application to the synthesis of many substances of the most complicated composition entering into the structure of organised

bodies, and to the creation of an unlimited number of carbon compounds, among which the colours derived from coal tar stand prominently forward, surpass the synthetical powers of Nature itself. Yet this teaching, as applied to the structure of carbon compounds, is not on the face of it directly applicable to the investigation of other elements, because in examining the first it is possible to assume that the atoms of carbon have always a definite and equal number of affinities, while in the combinations of other elements this is evidently inadmissible. Thus, for example, an atom of carbon yields only one compound with four atoms of hydrogen and one with four atoms of chlorine in the molecule, while the atoms of chlorine and hydrogen unite only in the proportions of one to one. Simplicity is here evident and forms a point of departure from which it is easy to move forward with firm and secure tread. Other elements are of a different nature. Phosphorus unites with three and with five atoms of chlorine, and consequently the simplicity and sharpness of the application of structural conceptions are lost. Sulphur unites only with two atoms of hydrogen, but with oxygen it enters into higher orders of combination. The periodic relationship which exists among all the properties of the elements, such, for example, as their ability to enter into various combinations, and their atomic weights, indicate that this variation in atomicity is subject to one perfectly exact and general law, and it is only carbon and its near analogues which constitutes cases of permanently preserved atomicity. It is impossible to recognise as constant and fundamental properties of atoms, powers which, in substance, have proved to be variable. But by abandoning the idea of permanence, and of the constant saturation of affinities—that is to say, by acknowledging the possibility of free affinities—many retain a comprehension of the atomicity of the elements "under given conditions"; and on this frail foundation they build up structures composed of chemical molecules, evidently only because the conception of manifold affinities gives, at once, a simple statical method of estimating the composition of the most complicated molecules.

I shall enter neither into details, nor into the various consequences following from these views, nor into the disputes which have sprung up respecting them (and relating especially to the number of isomers possible on the assumption of free affinities), because the foundation or origin of theories of this nature suffers from the radical defect of being in opposition to dynamics. The molecule, as even Laurent expressed himself, is represented as an architectural structure, the style of which is determined by the fundamental arrangement of a few atoms, while the decorative details, which are capable of being varied by the same forces, are formed by the elements entering into the combination. It is on this account that the term "structural" is so appropriate to the contemporary views of the above order, and that the "constructors" seek to justify the tetrahedric, plane, or prismatic disposition of the atoms of carbon in benzole. It is evident that the consideration relates to the statical position of atoms and molecules and not to their kinetic relations. The atoms of the structural type are like the lifeless pieces on a chess-board; they are endowed but with the voices of living beings, and are not those living beings themselves; acting, indeed, according to laws, yet each possessed of a store of energy, which in the present state of our knowledge, must be taken into account.

In the days of Haüy, crystals were considered in the same statical and structural light, but modern crystallographers, having become more thoroughly acquainted with their physical properties and their actual formation, have abandoned the earlier views and have made their doctrines dependent on dynamics.

(*To be continued.*)

Correspondence.

Evening Classes.

Sir,—I see by the report in last week's Journal that Mr. Martin intends to raise a discussion upon educational matters when the Council re-assembles in October. I am an interested party, namely, a registered student, and with your permission I should like to make a few remarks upon the Society's school.

I often wonder why the Society's laboratory, admitted to be one of the best in the world, is night after night shrouded in darkness, whilst such places as King's College, Owens College, Manchester, Finsbury Technical College, and a host of others, are ablaze with light and filled with seekers after knowledge. Many of these evening workers at the metropolitan institutions belong to the pharmaceutical fraternity. I think it will be admitted that their proper place is the Society's own school; their only fault, like my own, is that they have neither the time nor the needful to go through a full day course. I have subscribed to the Society for some years; a certain percentage of my annual subscription goes towards laboratory equipment, etc., and what do I get in return? The very great privilege of being compelled to go to outside institutions for my education, instead of the school to which I subscribe.

Granted, I have the use of the library, which I duly appreciate, and the doubtful privilege of viewing chemical specimens through three or four thicknesses of glass, giving rise in some instances to optical delusions. Reading and specimen viewing are all very well in their way, but chemists are not made by such means. We students are continually having it drummed into us by our elders, that "practice is the only way to learn;" yet practice, under the present system at the Square, is the only thing denied to us. I am sure there are many students situated as myself, who would gladly attend one or two evenings per week through the winter session if they had the chance, provided the fees were arranged on a popular basis; they might also be allowed to compete for the Society's prizes after a full course of instruction. In these days of keen competition do not let us forget that the chemist's business is essentially a trade, and a most honourable one too. Give us the means of becoming proficient in our own business, and do not let us waste our energies in striving after the "new goal" or "those high and noble principles" advocated by your correspondent signing himself "J. Wellesley Douglas."

I do not think that a window full of University diplomas and assistants wearing their hoods behind the counter would enable your correspondent to get better prices for his wares than his neighbour, who is a simple pharmaceutical chemist and a practical business man.

A Registered Student.

W.P.—The present Director of the Jamaica Botanical Gardens is Mr. W. Fawcett, F.L.S.

W. J. Shepperd.—(A). *Polystichum angulare.* (B). *Filix Mas. Athyrium Filix-fœmina* prefers the neighbourhood of water.

Nemo.—*Viburnum Lantana.*

G. Fox.—(1) *Verbena officinalis.* (2 and 3) *Atriplex hastata.* (4) *Chenopodium album.* (5) *Senebiera Coronopus.* Specimens belonging to the natural order Chenopodiaceæ should always be sent in fruit and with lower as well as upper leaves.

J. Pumphrey.—*Lycium barbarum*: not indigenous.

J. H. Fisher.—*Erythræa Centaurium.*

M. P. S. I.—We cannot undertake to specify which is the best among the numerous recipes for preparations for stimulating the growth of hair.

E. B. Vizer.—*Lac Fermentatum*, U. S. Nat. Form.—Cow's milk, fresh, 32 fluid ounces; yeast, semi-liquid, 60 minims; sugar, 1 troy ounce. Dissolve the sugar in the milk, contained in a strong bottle, add the yeast; cork the bottle securely and keep it at a temperature between 75° and 90° F. for six hours; then transfer it to a cold place.

Communications, Letters, etc., have been received from Messrs. Barton, Shapley, Hird, Donellan, Blair, Bennett, Thompson, Interested, Botanist, F. C. S.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 105.)

The notices of the raw materials exhibited by various French colonies and other countries must necessarily be somewhat unequal. In some cases, in consequence of the impossibility of getting information concerning the articles exhibited from either labels or attendants, the description of a court will have to be limited to a brief enumeration of the vegetable and other products exhibited. In other cases it has been possible to obtain special and even voluminous information relating to the local medical use of drugs exhibited and other interesting subjects, much of which has not previously been published, and to place this on record, even in a condensed form, will occupy an apparently disproportionate space. In this part of the report the courts will be taken separately in alphabetical order, according to the names of the respective countries.

ALGERIA.—As might be supposed, this important colony sends a great variety of substances, drawn from all three kingdoms of Nature, the use of many of which will no doubt develop in the parent country, if nowhere else. Here may be seen some magnificent specimens of the "Algerian onyx" that has recently received increased attention. This beautiful stone, which is a translucent limestone containing traces of magnesia and carbonate of iron, comes from the province of Oran. It is marbled in different colours and occurs in large blocks which lend themselves to ornamental sculpture and architectural purposes. Calamine is also shown in almost all shades and in considerable abundance, as well as salt from the salines, paraffin and petroleum. Maize and "hard" or glutinous corn are also well represented, together with semola and the maccaroni and vermicelli pastes for the manufacture of which the hard corn is well adapted. Among other alimentary substances are beans of various kinds, red potatoes, sweet potatoes, tomatoes in powder, olives and olive oil, some rather small figs, dates well packed and valued at 125 francs the 100 kilograms, sugar from *Sorghum saccharatum*, red and white wines from Oran, brandy and liqueurs. There is also some fine looking "maté," or Paraguay tea (*Ilex paraguayensis*), as well as the indigenous "sanguinaire," or Arab tea. The latter appears to be largely used, not only as a diaphoretic medicine in colds and febrile attacks, but also as a beverage, one firm alone (Legout and Peyron) exporting 200 to 300 kilos per year. It consists chiefly of the flowering tops of *Paronychia argentea*, L., but those of *P. nivea*, DC., *P. capitata*, Lan., *P. longiseta* and *P. Cossoniana*, Web., are also collected. "Café nègre," from *Cassia occidentalis*, is also shown. Another product used as food by the natives occasionally is the carob or locust bean (*Ceratonia siliqua*), and these are accompanied by various oil materials, such as ricinus seeds (*Ricinus sanguineus*), ground nuts, Indian hemp seed and linseed. Among other medicinal seeds or fruits may be noticed anise, sweet fennel, dill, cummin, caraway, coriander, henbane, stramonium, stavesacre and conium. The cummin, anise and the caraway, which is like that of Mogador, are large varieties, but the coriander is not larger than the English or Dutch kind. The coriander leaves, in spite of the disagreeable odour (like that of the common bed bug) which they possess in the fresh state, are stated to be used as a substitute for parsley by the Arabs. All the above plants are cultivated in Algeria to a limited extent, but coriander more extensively than the others. One point in connection with these aromatic fruits and seeds requires notice here. It appears that the Arabs cultivate conium in Algeria and use the fruit as a sedative under the name "harmel," a name also applied to the aromatic seeds of *Peganum Harmala* (Rutaceæ). Sometimes by way of distinction the former is called "harmal-el-djezari" or "harmel d'alger," but this is not usually the case. It is doubtful if the henbane seeds are the produce of *H. niger*, which is rather a rare plant, *H. albus* being the common species. Another species, *H. Falezlez*, common in the Sahara district, evidently possesses powerful properties, being used as a poison. *Datura Stramonium* is common in Algeria, and the seeds are collected for export. Although mandragora grows in Algeria it does not appear to be collected. "Garou" (*Daphne Gnidium*) bark, which is official in the Codex, is shown in little oblong bundles about three inches in length by one to two in diameter, suspiciously like those sold in this country as the bark of *D. Mezereum*. Among other medicinal substances are thapsia root, from which the rubefacient resin is obtained; bryony root; eucalyptus, myrtle, mallow and walnut leaves; and the leaves of *Artemisia herba-alba*, which under the name of "chikh" enjoy a reputation among the natives as having tonic, aperient and vermifuge properties. The fruit of *Anagyris fœtida*, or false senna, is of interest as giving rise to as many cases of poisoning in Algeria as laburnum does in this country. Its active principle, the alkaloid anagyrine, discovered by M. Bechamp, of Montpellier, in 1867, recently formed the subject of a research by M. Gallois and Hardy (*Compt. Rend.*, cvii., 247), and Dr. Reale (*Pharm. Journ.*, [3], xviii., p. 743). *Atractylis gummifera*, known as "adad," is another toxic plant, of which the root and gummy exudation (the latter valued at 10 francs per kilo) are shown. Like anagyris, it frequently gives rise to cases of poisoning, the exudation being sold as a kind of glue. The root is also used in Morocco (*Pharm. Journ.*, [3], vi., 522), and an account of the plant may be found in the *Bull. Soc. Bot. Fr.* (vols. xiii. and xiv.). Henna, used by the natives for dyeing the nails, is also employed by the Arabs as a vulnerary, and as a remedy for leprosy. It forms an important article of commerce in Algeria. It does not appear that the essential oil of the flowers, which has a delicious odour, like that of the tea rose, is distilled in Algeria, although several essential oils are distilled in considerable quantities. Of *Eucalyptus Globulus* about 2000 kilos of volatile oil are said to be produced annually in Algeria, the leaves being only in slight demand for medicinal purposes. About 120 species of eucalyptus are cultivated in Algeria, but the essential oil of only one other species, *E. citriodora*, is shown, and it does not appear that either this or that of myrtle, which is also exhibited, is a commercial article.

The oil of wormwood shown is probably not derived from *A. Absinthium*, which is a comparatively rare plant, growing in the mountainous part of Algeria. The species commonly used appears to be *A. arborescens*, L., which is employed in medicine by

the natives and is sold in all the markets. The oil is prepared by peripatetic distillers who carry their apparatus to districts where the plant is abundant. The oil of pennyroyal is largely distilled, the amount being estimated at about 2000 kilos. Oils are also distilled from *Mentha rotundifolia*, *M. aquatica*, *M. sylvestris*, and some calamints, but under what name these enter French commerce is not stated. The oils of lemon, neroli and petit grain do not form a large industry. Messrs. Chiris and Gros, of Boufarieh, state that although they turn out about 150 to 200 kilos of oil of neroli bigarade annually, the trade has been much injured by the competition with Paraguay, as that country sends over an oil under that name at a much cheaper rate, which, however, possesses more nearly the odour of petit grain. A *genuine* essence of lemon cannot be made at a marketable price, and the oils made by the cold process are therefore only used for local consumption. Orange leaves are, however, exported in considerable quantity, and orange flower water is made on a large scale. The oil of geranium is extensively distilled in Algeria, one firm alone at Boufarieh producing about 2000 kilos per annum. The plants chiefly cultivated are *Pelargonium Radula*, *P. capitatum*, Ait., and *P. roseum*, Willd. The plants afford three crops for distillation during the year.

It is somewhat surprising that this branch of industry has not been more developed, since several plants grow freely in the country which might yield valuable perfumes. Thus the ladaniferous cistuses are common; *Lavandula vera* and *Rosa gallica*, etc., grow freely; and the flowers of *Citharexylon quadrangulare*, common in streets and gardens, would lend themselves to enfleurage. *Lippia* (or *Aloysia*) *citriodora*, better known in this country as the lemon-scented verbena, is largely cultivated, one firm (Legout and Peyron) exporting 700 to 800 kilograms of the leaves annually. "Cassie" flowers (*Acacia Farnesiana*), as well as the pod and seeds, are also shown. Cassia flowers form a distinct industry, the trees being largely cultivated for the flowers, and often spring up spontaneously. As much as 20,000 kilograms of flowers are said to be used by one firm alone (Chiris and Gros) at Boufarieh.

It is interesting to notice the prices given on some of the specimens as to the market value in Algeria of some of the products used in this country. Thus pomegranate bark varies in price according to the size of the pieces and the part of the plant it is derived from, trunk bark being valued at 2 francs per kilo, branch bark 1½ francs and root bark at 60 centimes per kilo. It appears to be largely collected, Messrs. Legout and Peyron (Algiers) exporting annually from 2000 to 3000 kilos, part of which is destined for the manufacture of pelletierine. Chian turpentine ("terebinthe dit de Chio"), apparently derived from *Pistacia Terebinthus*, is valued at 20 francs the kilo, the specimen, so far as could be judged from the outside of the bottle, appearing of good quality. The Arabs use the curious long, horn-shaped galls of this tree, as well as the leaves, for tanning and to give a black dye.

Pistacia atlantica is said to yield a turpentine called "alk," and *P. Lentiscus* an oleo-resin which does not dry into mastic. An aromatic fixed oil is obtained by boiling the lentisc seeds in water; and is used as an application for rheumatism by the Arabs.

Vesicating insects are exhibited of two kinds, one being a mixture of various species of *Mylabris*, differing slightly in markings from the Chinese drug. These are valued at 20 francs the kilo. The other specimen consists of the well-known *Meloe majalis*, and is valued at 12 to 16 francs per kilo.

A fine specimen of ergot of diss (*Ampelodesmos tenax*) is shown. This is valued at 4 to 8 francs per kilo and is stated to be more active than ergot of rye (see *Pharm. Journ.*, [3], xvi., p. 684). As noticed in the report on the Paris Exhibition of 1878, many of the herbs and roots exhibited are practically substitutes for other species used in European countries. To those then mentioned may be added *Pæonia atlantica*, *Berberis hispanica* and *Glycyrrhiza brachycarpa*, used respectively as substitutes for peony root, barberry bark and liquorice root. *Santolina Chamæcyparissias* and *Santolina squarrosa* are also employed by the Arabs in place of camomile.

Other plants mentioned in the official catalogue as being used by the Arabs in medicine are:—

Peganum Harmala (Rutaceæ); used for rheumatism, purulent ophthalmic and skin diseases.

Melilotus macrocarpa, Durieu (Leguminosæ), the seeds of which are employed as an antispasmodic.

Opuntia Ficus-Indica (Cacteæ). The rasped mucilaginous stems are made into a poultice, and the flowers, which are mucilaginous and astringent, into a drink for diarrhœa.

Diotis candidissima (Compositæ), febrifuge and emmenagogue.

Marrubium vulgare; used as a febrifuge under the name "maroube," the somewhat similar name "maroute" being given to *Anthemis Cotula*.

Limoniastrum Grunovianum (Plumbaginaceæ) is used as an antiscorbutic.

Cynomorium coccineum (Balanophoreæ), employed as an astringent.

Juglans regia. The root bark is used as a dentifrice.

Ulva lactuca (Algæ), used both as a food and as a vermifuge.

Other plants employed in medicine by the Arabs, but of which the uses are not given, are *Pulicaria mauritanica*, *P. dysenterica*, *Inula viscosa*, *Calamintha officinalis* and *Teucrium Polium*; the leaves of the walnut, the seeds of *Urtica pilulifera* and the fruits of *Juniperus phœnicea*. *Juniperus oxycedrus* is said to be very abundant and much employed by the natives for preparing huile de cade.

Among the chief medicinal exports of the country pellitory and squill roots figure largely. One Algerian firm exports yearly from 500 to 600 kilos of the dried squills, of which a reddish-coloured bulb is shown. The bulb is said to sometimes attain a weight of 7 or 8 kilos. *Spergularia rubra* is exported to the extent of 300 to 400 kilos, the leaves and flowers of *Malva sylvestris* to 1000 or 1200 kilos, *Erythræa Centaurium*, sometimes mixed with *E. pulchella*, which is less bitter, to 2000 or 3000 kilos, and borage flowers still more largely, by Messrs. Legout and Peyron, of Algiers. These figures give some idea of the extent to which the trade in herbs is carried on in Algeria. Another important Algerian industry is illustrated in the exhibits of "vegetable horsehair," cellulose from the trunk and leaf of the date palm, alfé, and other paper-making materials. Cork in fine slabs is exhibited and some tobacco.

(*To be continued.*)

BALSAMODENDRON BERRYI.

BY DAVID HOOPER.

Buchanan's interesting 'Journey through Mysore, Canara and Malabar' mentions (p. 8, vol. ii.) a species of myrrh about which little is known. "Many of the hedges here and in other parts of Coimbatore, are made of a thorn called *Mulukilivary*. It seems from its habit to be a *Rhus*; but not having found the fructification, I am very uncertain concerning its place in the botanical system. It makes a very good fence; cuttings three or four cubits long are put into the ground between March 12 and April 10. The ends are buried in the earth about a span, and very soon shoot out roots. From the moment it is planted it forms a fence against cattle; but seems to require a better soil than either *Euphorbium Tirucalli* or *E. Antiquorum*, which are the most common hedges here, and will grow anywhere."

The Mulukilivary in the above extract is the *Balsamodendron Berryi*, Arnot, and Coimbatore, the habitat of the plant, is a district lying to the south of the Nilgiri Hills. Hearing that a gum resin similar to the official myrrh could be obtained from this shrub, inquiry was made for samples and for information respecting it. The District Forest Officer of North Coimbatore forwarded me a sample of the gum resin in October last, and furnished the following information. The gum-resin is used here by the natives medicinally. It is not collected for commercial purposes. It may be more abundantly procurable between the months of February and July. The cost of collection would come to Rs. 4 per maund (of 25 lbs.). The District Forest Officer of South Coimbatore sent me a sample rather inferior to the first, pointing out that the exudation was not used by the natives in the district in medicine or the arts, nor was it collected for commercial purposes.

The gum-resin was in pale yellow, yellowish-brown, or brown translucent fragments, tough, and breaking with a shining conchoidal fracture. The surface had an oily appearance, and when scratched or rubbed with some hard implement showed milk-white markings. Pieces of reddish-brown bark were attached to some fragments, and others were adhering to cloth in which it had been collected. Powder was of a dirty white colour, and when rubbed up with water made a thin emulsion. The odour was oily, not fragrant. Colonel Beddome alludes, however, to an aroma given off by the plant. The taste was simply mucilaginous. It dissolves for the most part in water, leaving a few flocks of soft resin and impurities undissolved.

A selected sample of the gum-resin gave to water 84 per cent. of gum; it contained 5 per cent. of moisture and 6·6 per cent. of mineral matter. The gum was gelatinized by ferric chloride, and like that from true myrrh, was not precipitated by neutral plumbic acetate. The resin was soft, transparent, tasteless, odourless and neutral in reaction. It was soluble in alcohol, ether, bisulphide of carbon and chloroform. The solution in alcohol was not coloured by ferric chloride, and gave a right-handed rotation when examined with polarized light. The resin moistened with alcohol gave no colour with concentrated nitric or hydrochloric acid, and no violet liquid was obtained when bromine was added to its solution in carbon bisulphide. The resin separated by alcohol and evaporated was exposed to the heat of a water-bath for a week and remained soft and tenacious; after this it was exposed to the air for about two months, but its consistence was not altered, and when examined under the microscope was seen to be perfectly amorphous.

The myrrh from the *Mulukilivary* is evidently distinct from the true myrrh, Arabian myrrh and *Bissa Bol*. Its freedom from bitterness and fragrance would render it unfit as a substitute for the genuine drug and useless as a medicinal agent. It gives off no odour when burnt, and is therefore unsuitable as an ingredient in incense. It forms a good adhesive mucilage, and might be used as a convenient addition to some kinds of confectionery. An allied species of myrrh yielding a similar exudation is the *Balsamodendron pubescens*, growing in Beluchistan, and remarkable for the large proportion of gum in the gum resin.

THE PRESERVATION OF RHUBARB FROM INSECTS.

BY J. CH. SAWER, F.L.S., AND A. R. FERGUSON.

One of the queries propounded by the Committee of the American Pharmaceutical Association in 1874 was concerning the nature and identity of the insect which attacks rhubarb root, and Mr. Saunders, of Ontario, undertook to answer it.* At the annual meeting of that Society in 1875, Mr. Saunders was unable to reply, and requested the matter to be deferred for another year. Subsequent reports of the proceedings of the Association make no further mention of it.

The investigation now detailed was made at the request of a London drug broker, who furnished us with samples of the root containing the live insect; the object of the inquiry not being to identify the insect by name, but to ascertain the conditions of its life and the best method of exterminating it without damaging the drug.

The sample consisted of lumps which must have been originally of fine quality. These lumps, after being sawn in halves, were divided into several parcels for experiment, one piece being kept separately apart in a glass jar as original, for comparison. The interior of the lumps was found to be completely honeycombed by the insect, which was the caterpillar of a small greyish-white moth, commonly found in drug rooms where rhubarb is stored in bulk. The holes, or workings, were partly clogged up with a brown pulverulent mass which proved to be the excreta of the insect. The worms were of one-eighth to three-eighths of an inch in length, of a yellow or pale pinkish-brown colour. Examination under the microscope revealed a number of dark markings or spots of a black colour along the body, slightly elevated, with hairs springing from the centre of each spot. Apparently there were five pairs of legs, with hairy projections at the joints and claws at the end. The head consisted of two chocolate-coloured lobes, with legs at each side, and two inner claws or pincers. Two wedge-shaped black marks were observed at the back of the head.

Experiment I.—To estimate the loss of weight,

* 'Proceedings of American Pharmaceutical Association,' 1875, p. 571, and 1876, p. 818.

if any, which the root undergoes by being placed in a vacuum :—

Weight of sample before exhaustion, 6·2525 grams
„ „ after „ 6·2520 „

Experiment II.—To ascertain the effect, if any, which a vacuum has on the caterpillar in the root.—A small piece, weighing 6·23 grams, was thoroughly exhausted of air by means of an aspirator water-pump; a caterpillar came out of a hole in the root and crawled over the surface for a little distance. The vacuum was maintained for thirty minutes, during which, although the insect was sluggish in its movements, no sign of its giving way to the vacuum was apparent. A tall glass cylinder was then filled with carbon monoxide gas, and this gas was admitted to the exhausted receiver in which the insect was placed. After being allowed to inhale this gas for forty-five minutes it was removed and at once placed in a small glass jar, firmly closed, and set aside for ten days on a shelf in the laboratory for observation. At the end of this time the jar was opened, and slightly warmed. The insect appeared as if nothing whatever was wrong; beyond a slight darkening in the colour of its body no change could be observed. The effect on the root of this treatment was to make it not so hard as the fresh root, more easily broken between the fingers, and of not so fresh and strong an odour; it was more easily cut with a knife than root which had not been acted on, and had altogether a more spongy feel.

Experiment III.—To ascertain the effects of heat on a piece of the root and the caterpillar.—A small lump, with an insect upon it, was placed in a test-tube closed with a cork, through which a thermometer was inserted, also a piece of glass tube to allow of the escape of the heated air. The result was that at 45° C. the insect was twisting about, and at 80° C. was dead. Its body was shrivelled up by this treatment.

Experiment IV.—Placed an insect and a piece of root in a hot-water oven, temperature 90° C. At moment of introduction insect was lying torpid—

Fifteen seconds afterwards it was lively.

Thirty seconds afterwards it was quiescent, passive.

One minute afterwards it was still alive, but very feeble.

Two minutes afterwards it was quite dead.

Three minutes afterwards its body curled up, split and shrivelled.

Determination of loss of weight or moisture by heating in hot-water oven at 90° C. :—

Original weight of sample	.	8·103	grams
Weight after 10 min. exposure	.	7·958	„
„ 20 „	.	7·820	„
„ 35 „	.	7·620	„
„ 45 „	.	7·542	„
„ 60 „	.	7·439	„

Another sample, weighing 5·815 grams, was exposed for ten minutes and then weighed 5·695 grams; this was then left exposed in an open glass capsule on a shelf (the day being moist and damp).

After 10 minutes it weighed	.	5·700	grams
„ 25 „ „	.	5·702	„
„ 35 „ „	.	5·710	„

This sample being left exposed to the air till the next day weighed 5·900 grams, thus gaining by moisture ·085 gram on its original weight, proving its power of absorption. After being thus heated for ten minutes the colour remained normal and the odour as usual and of same intensity, but it was not quite so hard as originally. This exposure of ten minutes may be excessive, as the insect was proved to die in two minutes at a temperature of 90° C., and in experiment III. was dead at 80° C.

Experiment V.—With pyrethrum.—A lump of the root with an insect upon it was placed in a small glass beaker and pyrethrum (or insect powder) sprinkled over it until completely covered. After twenty-five minutes contact the insect was active, and did not seem in any way inconvenienced.

Experiment VI.—Fumigation with sulphur dioxide gas.—A lump of the root with an insect was placed in a small glass jar, through which a current of SO_2 was caused to pass from a generator. The insect being forced to admit this gas by the air-tubes along its body was unable to sustain its suffocating effects; it was observed to writhe and twist about in evident pain, and in ten minutes was quite dead.

A piece of the root alone was then submitted to a much longer exposure to a current of the gas, with the result that it did not appear to be injured in any way whatever. Its texture remained perfect; the sponginess which was noticed in a previous experiment was entirely absent; the yellow colour of the exterior and pale pink colour of the interior were unaltered. Not the slightest difference could be observed when compared with a fresh piece of root except the odour of the sulphur dioxide gas, and this disappeared totally after one hour of exposure to the free air.

Process suggested for manipulating the rhubarb on a large scale :—As a result of these experiments it would appear that a combination of the heating process and the suffocating process is preferable, because, if the gas were applied to the root in its normal state the moisture contained in it would absorb a large volume of the gas and might tend to bleach it. Also, if any of the insects existed in the state of eggs, the gas alone might not destroy them. To combine the two processes the root might first be placed in a jacketed iron chamber heated by water to a temperature of 80° or 90° C. for five to ten minutes; the root then immediately placed in a tall wooden cylo or narrow upright case with a moveable bottom, and the gas evolved from a pan of burning sulphur blown through it from beneath by means of a revolving fan—the gas escaping from the top into a tall chimney. After about fifteen or twenty minutes of this treatment, the ignited sulphur to be removed, and a blast of ordinary air to be forced through by the fan for about an hour. The root could then be emptied out by removing the bottom of the cylo, and be packed into cases as usual; or, for further security into zinc-lined cases and soldered down, as the danger of fresh infection would lie in the chance of moths from other parcels depositing their eggs therein. Of course the degree of heat applied and the actual time of exposure both to heat and to the gas, in working on a large scale, would have to be determined by experiment, so as not to risk softening or bleaching the roots. Also the time of year for making the operation should be considered. Probably the best time would be when the egg first hatches, as the tenure of its life might then be more feeble.

OIL OF CAMPHOR.*

BY HENRY TRIMBLE AND HERMANN J. M. SCHRŒTER.

From the literature of camphor oil we find that no two investigators have obtained the same or even similar results. The physical descriptions of the oil are so different as to lead one inevitably to the conclusion that the commercial oil is a variable article. With this idea in mind we collected eight samples from different sources in Philadelphia and New York, and first made a preliminary examination of them with the following results :—

No I. was obtained of Mr. Samuel F. Simes of Philadelphia, who assured us that this sample correctly represented the crude oil from Japan. It had a reddish-brown colour, a specific gravity of 0·9632 at 16° C., and a boiling point of 180° C. The odour strongly resembled that of camphor and sassafras.

No. II. from Fritzsche Brothers, New York, was of a darker brown colour, much darker than No. I. It had a specific gravity of 0·9819 at 16° C., boiling point of 180° C., and an odour of camphor and sassafras.

No. III. was likewise from Fritzsche Brothers, and was marked "German." It had a sp. gr. of 0·8877 at 16° C., and a boiling point of 170° C. It was colourless, with terebinthinate and mild camphor odour.

No. IV. from a wholesale drug firm of Philadelphia was probably the same as No. III., as its boiling point was the same, its sp. gr. 0·8863 at 16° C., and its other physical properties identical.

No. V. from a dealer in New York was no doubt the same as III. and IV., as it only differed by having the sp. gr. of 0·8803 at 16° C.

No. VI. from a New York importing firm, marked "rectified," had a sp. gr. of 1·006 at 16° C., and boiled at 210° C. Its colour was a light yellow, and odour that of sassafras and slightly camphoraceous.

No. VII. from wholesale druggists of Philadelphia was similar to No. VI., with a sp. gr. of 0·9903, boiling point of 206° C., and somewhat darker colour.

No. VIII., also from a wholesale drug firm of Philadelphia, was dark reddish-brown, with an empyreumatic and camphoraceous odour, a sp. gr. of 0·9546 at 16° C., and a boiling point of 198° C.

They all had an acid reaction ; all were miscible in all proportions with 95 per cent. alcohol.

As I. and II. appeared to represent the crude product, they were taken for analysis. No. I. we were able to get in considerable quantity, and in most of the following work it was used.

The remaining samples were submitted to fractional distillation *in vacuo*, and samples III., IV. and V. were found to contain from 1–3 per cent. of camphor in solution in the light fractions of camphor oil. Samples VI. and VII. consisted of the intermediate portions of the commercial oil, the lowest and highest boiling fractions being entirely absent. Sample VIII. contained all the fractions, the lightest in smaller quantity, but it was quite empyreumatic, and yielded a considerable quantity of a solid residue at 235° C. Each sample was submitted to the action of polarized light, I., II. and VIII. being first decolorized with animal charcoal. The following readings were obtained with the 200 mm. tube in a Wild polaristrobometer :—

1.	+ 49°.
2.	+ 32·6°.
3.	+ 61°.
4.	+ 62·2°.
5.	+ 62·2°.
6.	+ 28·6°.
7.	+ 38·2°.
8.	+ 1°.

The following results, it will now be understood, apply to sample No. I. An alcoholic solution of ferric chloride produced no change when mixed with the oil, and negative results were likewise obtained with saturated solution of sodium bisulphite and with alcoholic ammonium sulphide. Alcohol and fixed oils were found to be absent from the sample.

On agitating the oil with water the latter absorbed the acidity, which was found by appropriate tests to be due to acetic and formic acids. The same portion of oil, after agitation with water, was boiled for some hours with an aqueous solution of potassium hydrate in a flask attached to an inverted condenser. The resulting potassium compound, decomposed by a mineral acid, separated into two layers. The aqueous layer was distilled, and in the distillate butyric acid was found, besides acetic and formic acids as above.

Three litres of the oil were fractionated *in vacuo*, and the distillate collected in four portions as follows :—

Per cent.			In vacuo.		Ord. pres.
1.—20	obtained	between	90°–110° C.,	or	180°–200° C.
2.—35	,,	,,	110°–120° C.,	,,	200°–210° C.
3.—25	,,	,,	120°–130° C.,	,,	210°–220° C.
4.—20	,,	,,	130°–150° C.,	,,	220°–240° C.

A small amount of resinous residue remained. A quantity of the oil was also distilled at ordinary pressure, but this method resulted in decreasing the amount of the higher boiling fractions and rendering them more empyreumatic. It was found, however, after the original oil was once fractioned, that the lightest portions could with advantage be distilled at ordinary pressure, but those of higher boiling points decomposed, and the use of vacuum was continued with them through all the rectifications. By redistilling the above four fractions, the lightest ones over sodium, until nearly constant boiling points were obtained, the following fractions resulted :

Fraction.	Boiling point.
A.—145°–155° C.	
B.—158°–161° C.	159°
C.—161°–167° C.	
D.—167°–169° C.	168°
E.—170°–171° C.	171°
F.—171°–175° C.	
G.—175°–177° C.	176°
H.—177°–180° C.	
J.—180°–182° C.	180°
K.—182°–202° C.	
L.—202°–206° C.	204°
M.—206°–212° C.	
N.—212°–214° C.	213°
O.—214°–230° C.	
P.—230°–235° C.	232°
Q.—235°–245° C.	
R.—245°–248° C.	247°
S.—250°–280° C.	Green oil.

It had better be explained that the fractions P, Q, R and S were not the result of fractional distillation alone, but were obtained by treatment to be hereafter explained from fresh portions of the oil. Only those fractions having constant boiling points were examined. All the polariscope readings were made in the 200 mm. tube, confirmed by the use of the 100 mm. tube. The vapour densities were made with the Victor Meyer apparatus. The combustions were carried out in an open tube with cupric oxide and a stream of oxygen. Over ninety combustions were made during the progress of the work, which has been carried on uninterruptedly since last December.

Fraction A. 145–155° C.—This fraction was found only in small quantity, having strong terebinthinate odour, of sp. gr. 0·8593 at 16° C., and dextro-rotary = + 53°. It was submitted to combustion with following results :—

* Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 52. Read at the Pharmaceutical Meeting, May 21. From the *American Journal of Pharmacy*, June.

I. 0·100 gm. substance yielded 0·3235 gm. CO_2 and 0·106 gm. H_2O.

II. 0·141 gm. substance yielded 0·453 gm. CO_2 and 0·146 gm. H_2O.

Calculated for $C_{10}H_{16}$.		Found. I.	II.
C . . .	88·23	88·22	87·62
H . . .	11·77	11·77	11·51
	100·00	99·99	99·13

Vapour Density:—

I. 0·1152 gm. sub. vaporized replaced 21 cc. air = 4·70.
II. 0·1012 „ „ „ „ 18·1 cc. „ = 4·73.
Calculated for $C_{10}HC_6$. = 4·71.

Fraction B. 158–161° C., *b. p.* 159° C.—This fraction of constant boiling possessed fragrant and terebinthinate odour, of sp. gr. 0·8616 at 16° C., and dextro-rotary = + 54°.

Combustions as follows :—

I. 0·109 gm. subst. yielded 0·350 gm. CO_2 and 0·114 gm. H_2O.

II. 0·111 gm. subst. yielded 0·358 gm. CO_2 and 0·1175 gm. H_2O.

Calculated for $C_{10}H_{16}$.		Found. I.	II.
C . . .	88·23	87·57	87·96
H . . .	11·77	11·62	11·76
	100·00	99·19	99·72

Vapour density :—

I. 0·1168 gm. subst. replaced 21 c.c. air = 4·76.
II. 0·1050 „ „ „ 18·7 c.c. air = 4·67.
Calculated for $C_{10}H_{16}$ = 4·71.

Fraction D. 167–169°, *b. p.* 168° C.—In somewhat larger quantity than Fraction B, of fragrant odour, colourless, sp. gr. 0·8678 at 16° C., and dextro-rotary = + 56·9°.

Combustions as follows gave results for a hydrocarbon :—

I. 0·1185 gm. yielded 0·381 gm. CO_2 and 0·124 gm. H_2O.

II. 0·129 gm. yielded 0·415 gm. CO_2 and 0·1355 gm. H_2O.

Calculated for $C_{10}H_{16}$.		Found. I.	II.
C . . .	88·23	87·68	87·74
H . . .	11·77	11·63	11·67
	100·00	99·31	99·41

Vapour density :—

I. 0·155 gm. subst. replaced 28 c.c. air = 4·72.
II. 0·172 „ „ „ 31·3 c.c. air = 4·68.
Calculated for $C_{10}H_{16}$ = 4·71.

Fraction E. 170–171° C., *b. p.* 171° C.—Of this fraction only a small quantity could be separated, but it consisted of a distinct fraction, with constant boiling point of 171° C. The specific gravity was found to be 0·8737 at 16° C., colourless, fragrant odour and dextro-rotary = + 584°.

Combustions gave results as follows :—

I. 0·116 gm. subst. yielded 0·3745 gm. CO_2 and 0·1221 gm. H_2O.

II. 0·1341 gm. subst. yielded 0·4315 gm. CO_2 and 0·1409 gm. H_2O.

Calculated for $C_{10}H_{16}$.		Found. I.	II.
C . . .	88·23	88·05	87·76
H . . .	11·77	11·69	11·67
	100·00	99·74	99·43

Vapour density :—

I. 0·1155 gm. subst. replaced 21 c.c. air = 4·67.
II. 0·1231 „ „ „ 22·5 c.c. air = 4·65.
Calculated for $C_{10}H_{16}$ = 4·71.

Fraction G. 175–177° C., *b. p.* 176° C.—This fraction was separated without much difficulty in large quantity and very constant. It was colourless, strong pleasant odour, resembling cajeput, of sp. gr. 0·8824 at 16° C., and strongly dextro-rotary = + 62·4°.

The following combustions and vapour densities give it the formula $C_{10}H_{18}O$:—

I. 0·1635 gm. subst. yielded 0·467 gm. CO_2 and 0·168 gm. H_2O.

II. 0·1684 gm. subst. yielded 0·4813 gm. CO_2 and 0·1733 gm. H_2O.

Calculated for $C_{10}H_{18}$.		Found. I.	II.
C . . .	77·92	77·89	77·94
H . . .	11·69	11·42	11·44
O . . .	10·39	10·69	10 62
	100·00	100·00	100·00

Vapour density :—

I. 0·164 gm. subst. replaced 26·4 c.c. air = 5·28.
II. 0·1724 „ „ „ 27·4 c.c. air = 5·35.
Calculated $C_{10}H_{18}O$ = 5·33.

Fraction J. 180–182°, *b. p.* 180° C.—Fraction of oil boiling between 185–200° C., on repeated distillation over sodium, gave a small portion of quite constant boiling point, which was with much difficulty obtained quite pure. It had a fragrant odour, was colourless, with sp. gr. 0·8933 at 16° C., and of strong dextro-rotary power = 64·8 C.

Combustions gave results as follows :—

1.—0·1400 gm. subst. yielded 0·4481 gm. CO_2 and 0·147 gm. H_2O.

II.—0·1475 gm. subst. yielded 0·4740 gm. CO_2 and 0·1540 gm. H_2O.

Calculated for $C_{10}H_{16}$.		Found. I.	II.
C . . .	88·23	87·29	87·64
H. . . .	11·77	11·67	11·60
	100·00	98·96	99·24

Vapour density :—

I.—0·1434 gm. subst. replaced 25·5 c.c. air = 4·80.
II.—0·1282 „ „ „ 22·9 c.c. air = 4·78.
Calculated for $C_{10}H_{16}$ = 4·71.

Fraction L. 202–206° C., *b. p.* 204° C.—Between 200°–208° C., on repeated distillation, solid camphor separated, which formed in the receiver a semifluid mass. On separating the fluid portion and drying the crystals, they gave on analysis results for camphor. An alcoholic solution was found to possess dextro-rotary power.

Results of combustion :—

I.—0·1975 gm. subst. yielded 0-5716 gm. CO_2 and 0·1930 gm. H_2O.

II.—0·205 gm. subst. yielded 0·590 gm. CO_2 and 0·1940 gm. H_2O.

Calculated for $C_{10}H_{16}O$.		Found. I.	II.
C . . .	78·94	78·93	78·49
H . . .	10·53	10·85	10·51
O . . .	10·53	10·22	11·00
	100·00	100·00	100·00

Vapour density :—

1. 0·083 gm. subst. replaced 13·5 c.c. air = 5·28.
II. 0·115 „ „ „ 18·9 c.c. air = 5·23.
Calculated for $C_{10}H_{16}O$ = 5·26.

Fraction N. 212-214° C., *b. p.* 213° C.—The portion boiling at 208-220° C., on rectification, gave a fraction boiling at 212-214° C. Before it was rectified it was placed in a freezing mixture, the separated camphor removed, and on redistilling more camphor separated out in the receiver. This was the case invariably on redistilling the oil after the camphor had been re-

moved. On separating the camphor as near as possible by the use of a freezing mixture, the fraction boiling at 212-214° C. gave the following results, corresponding to the formula $C_{10}H_{18}O_2$.

It was colourless, of mild camphor odour, sp. gr. 0·9802 at 16° C., and dextro-rotary = +53·4°.

Combustions :—

I. 0·1830 gm. subst. gave 0·4750 gm. CO_2 and 0·1717 gm. H_2O.

II. 0·1935 gm. subst. gave 0·5010 gm. CO_2 and 0·1840 gm. H_2O.

Calculated for $C_{10}H_{18}O_2$.		Found. I.	II.
C	70·59	70·78	70·61
H	10·59	10·43	10·56
O	18·82	18·79	18·83
	100·00	100·00	100·00

Vapour density :—

I. 0·1620 gm. subst. replaced 23·5 c.c. air = 5·92.
II. 0·1540 „ „ „ 22·5 c.c. air = 5·88.
Calculated for $C_{10}H_{18}O_2$ = 5·89.

Fraction P. 230-235° C, *b. p.* 232° C.

It was with great difficulty that a compound with constant boiling point was obtained, and when obtained, it was found still to exert a perceptible action on polarized light. As by simple fractionation the desired result could not be obtained, several litres were treated with an aqueous solution of potassium hydrate, and the light portion distilled off in a vacuum. From that remaining in the still, the aqueous solution of potassium hydrate was separated, and the oil distilled in vacuo. That portion which would have distilled at the ordinary pressure of 230°–250° C., was collected, and on repeated rectification at ordinary pressure, a fraction boiling between 230°-235° was obtained. It had the physical and chemical properties of safrol. It was colourless, highly refractive, with the characteristic sassafras odour, of sp. gr. 1·101 at 16° C., and almost inactive on polarized light = +1·8°.

Results of combustions as follows :—

I.—0·1862 gm. subst. yielded 0·507 gm. CO_2 and 0·1050 gm. H_2O.

II.—0·1921 gm. subst. yielded 0·5192 gm. CO_2 and 0·1130 gm. H_2O.

Calculated for $C_{10}H_{10}O_2$.		Found. I.	II.
C	74·07	74·26	73·71
H	6·17	6·26	6·53
O	19·76	19·48	19·76
	100·00	100·00	100·00

Vapour density :—

I.—0·1823 gm. subst. replaced 28 c.c. air = 5·59.
II.—0·1670 „ „ „ 25·8 c.c. „ = 5·56.
Calculated for $C_{10}H_{10}O_2$ = 5·61.

Fraction R. 245°-248° C., *b. p.* 247° C.

Three litres of the oil were treated with aqueous solution of moderately strong potassium hydrate, and subjected to distillation *in vacuo*, until the lighter boiling fractions were removed. The aqueous solution containing the eugenate of potassium was separated and decomposed by a mineral acid. The separated, dark, oily layer collected, dried and rectified *in vacuo*, gave a product with a boiling point at the ordinary pressure of 247° C. It had a yellowish colour, becoming darker on exposure to light, was strongly refractive, with a decided odour of cloves and a sharp burning taste.

It had a specific gravity of 1·057 at 16° C., and was almost inactive on polarized light = +1·4°.

Results of analysis gave the formula $C_{10}H_{12}O_2$.

I.—0·2258 gm. subst. gave 0·607 gm. CO_2 and 0·1475 gm. H_2O.

II.—0·1788 gm. subst. gave 0·4805 gm. CO_2 and 0·120 gm. H_2O.

Calculated for $C_{10}H_{12}O_2$.		Found. I.	II.
C	73·17	73·31	73·29
H	7·32	7·26	7·45
O	19·51	19·43	19·26
	100·00	100·00	100·00

Vapour density :—

I.—0·2135 gm. subst. replaced 32 c.c. air = 5·74.
II.—0·1820 „ „ „ 27·2 „ „ = 5·76.
Calculated for $C_{10}H_{12}O_2$ = 5·68.

Fraction S. 250–280° C.—The treatment of the oil with potassium hydrate gave a larger quantity of this high boiling fraction than the direct distillation of the oil. It had a bluish green colour, which with No. I. oil was not permanent, but changed on several days standing to violet, afterwards to pink and then to light brown. The same fraction from No. II. oil was darker coloured and has not faded as yet. A three per cent. solution of the fraction boiling at 260° to 280° C., in glacial acetic acid, gave a fine violet colour on the addition of a few drops of concentrated sulphuric acid. According to Wallack this would indicate a sesquiterpene. The quantity, however, was too small to determine whether it was a definite compound or not.

From the above results we conclude that the following distinct and definite compounds exist in the sample, with a close approximation of the quantity of each :—

		Boiling point.	Per cent.	Formula.
(1)	From 145°–155° C.	150°	0·40	$C_{10}H_{16}$.
(2)	„ 158°–161° C.	159°	12·00	$C_{10}H_{16}$.
(3)	„ 167°–169° C.	168°	13·00	$C_{10}H_{16}$.
(4)	„ 170°–171° C.	171°	5·00	$C_{10}H_{16}$.
(5)	„ 175°–177° C.	176°	15·00	$C_{10}H_{18}O$.
(6)	„ 180°–182° C.	180°	4·00	$C_{10}H_{16}$.
(7)	„ 202°–206° C.	204°	10·00	$C_{10}H_{16}O$.
(8)	„ 212°–214° C.	213°	30·00	$C_{10}H_{18}O_2$.
(9)	„ 230°–235° C.	232°	7·00	$C_{10}H_{10}O_2$.
(10)	„ 245°–248° C.	247°	2·00	$C_{10}H_{12}O_2$.
(11)	„ 250°–280° C.	—	1·60	Green oil.

We do not consider that the above lighter fractions have been so satisfactorily identified, as to warrant naming them. The others have already been named by previous investigators, and were fully identified by us. It is possible that (6) consists of dipentene, since Wallach discovered considerable quantities of it in the camphor oil. (5) may be cineol, but we have been unable to get all the reactions necessary for its identification. The odour, however, is characteristic and strongly points to the possibility of cineol being present, but the polarization is decidedly different from that obtained from wormseed oil, which is inactive. Recently there has appeared a statement of the composition of camphor oil by Schimmel and Co.*

Our work, however, was nearly completed, as far as now published, when the above pamphlet was issued. The results in part agree, and we can only say that probably they are as similar as might be expected from different investigators on different samples of such a varied substance as this oil appears to be.

Another important paper on the composition of camphor oil was published in 1885, by Yoshida,† who found it to consist of terebinthene, citrene, camphor and camphorogenol. Had we used sample of oil No. VI. for the basis of our work the results would probably have approached his. He in turn failed to find in his sample the compound noted by Oishi,‡ who, in addition to camphor, found a hydrocarbon of the composition $C_{12}H_{20}$. We cannot but conclude that these

* *Berichte* von Schimmel and Co., Leipzig, April, 1889. See *Pharm. Journ.*, April 6, 1889, p. 804.

† *Journ. Chem. Soc.*, 47, 779.

‡ *Journ. Soc. Chem. Industry*, 2, 353.

two gentlemen experimented on the true oil, since they carried on their investigations near its source, Since it has become known that the high boiling fractions of the oil are so valuable, it will be safe to conclude that the colourless rectified oils of low specific gravity do not contain all the compounds which naturally belong in this complex substance.

CHINESE METHOD OF PREPARING EXTRACT OF OPIUM.*

BY JOHN CALVERT.

Some years ago I had an excellent opportunity of observing the process of manufacturing this extract, as followed by the Chinese experts, who prepare the domestic article from Turkey opium in San Francisco. The details of the process are kept as a profound secret by them and their employers, the wealthy Chinese merchants, but owing to exceptional circumstances I was enabled to study the subject and become thoroughly conversant with every point. And I may as well state before proceeding further, that I am betraying no confidences, and I paid dearly for the information which I am about to place before you. I do not think that even now I should have been inclined to expose the details of a process which has a considerable commercial value, except for the reason that this occasion is a remarkable one in the history of American pharmacy.

I need not tell you how to prepare extract of opium. It is merely an aqueous infusion evaporated on a water-bath to a pilular consistence. An addition of 5 per cent. of glycerin is ordered in the last edition of the United States Pharmacopœia.

The Chinaman proceeds otherwise. His apparatus consists of two charcoal burning fire-clay furnaces, about fifteen inches high and of about the same width, open on three sides; some palm leaf or other cheap fans, for fanning himself and the fire; several brass pans, such as are here shown; a brass ladle and several tin ones; a large spoon for skimming; a gridiron; two pair of pincers for lifting the pans, and some thick woollen cloths to protect the hands; some fibre brushes, several buckets, basket strainers, muslin for straining, fibrous material for drawing off the liquor; some heavy sticks to be used as pestles; several spatulas about a foot long and three inches wide at lower end, and made of oak or ash, and a steel-bladed scraper.

One or two low stools complete the arrangements. The operator does not require any tables or benches, as all the work is done on or near the ground. The operation requires two days, but after the first day the two days' work goes on regularly, and a batch of extract is turned out by the same workman every evening.

The quantity of opium operated upon, so that a workman can do a fair day's work, is usually about 16 or 18 pounds. The balls are placed in tepid water, to soften the surface, and they are washed by hand to remove grit, leaves, and other foreign substances.

The material is then placed in one of the shallow concave brass pans, which is kept gently heated over the naked charcoal fire, and by means of the wooden pestle is kneaded into a soft paste. When homogeneous, the softened opium is uniformly spread over the inner surface of the pan, and patted down by the hand, so as to give it a smooth surface. The heat is continued until a greater part of the moisture has evaporated, and the opium has become so solid that the pan can be turned over. The direct heat of a very small fire is now allowed to act directly on the face of the opium by turning the pan upside down. This has to be carefully and skilfully done. As soon as the surface of the material has become sufficiently hardened it is deftly removed in thin layers, and this is continued until all the opium has been taken from the pan, except the dried portion, which remains attached to the bottom and sides of the vessel. This is scraped off.

The gridiron now comes into play. The crusts which were laid aside in the former operation are now put on the gridiron a few at a time, with the greatest care, to avoid breaking them, and are toasted over the charcoal at a low temperature until they have become perfectly crisp. The crusts are then placed in one of the brass pans, covered with warm water, and left standing until the next morning.

On resuming work the infusion is drawn off into buckets through baskets lined with muslin strainers.

The brass pan is slightly tilted, and by means of a knot of vegetable fibre the liquor is drawn off over the edge of the pan without loss. The roasted opium is drained, and a second quantity of warm water added, with as little breakage of the crust as possible, and the extraction is finished with a third lot of water. Only the first and second infusions are used for the extract: the washings and weak infusion are employed for the extraction of the next batch. There seems to be no precise rule as to the quantity of water for making the infusion—the crusts are merely covered.

The infusion is then mixed with some egg albumen, and a part of it is placed in the largest of the brass pans over the naked charcoal fire, and is heated, skimmed, and boiled constantly. The pan is not filled, but room is allowed for frothing, and fresh portions of warm infusion containing albumen are added from time to time as the bulk diminishes. During the boiling there are several matters to be attended to, such as keeping up the fire, or banking it up with ashes if too hot, prevention of boiling over by addition of small quantities of the infusion, or of water, and keeping the sides of the pan free from hardened extract. This is effected by water and the fibre scrubbing brushes. When all the infusion has been added, and the evaporation has proceeded as far as is considered to be necessary, the pan is removed from the fire, and the extract constantly stirred by means of a wooden spatula in a current of air produced by fanning until cool and uniformly mixed.

The yield of extract varies according to the kind and quality of opium, but I have not observed any very remarkable difference between the results of this and those of the ordinary pharmaceutical methods. Eighteen pounds of first quality Turkey opium generally yields about 10 pounds of this extract.

The greatest watchfulness is exercised over the roasting or toasting part of the process. Although a small exposed corner of the crusts may become charred occasionally, the object of this operation is to expose the opium to such a heat only as to render it porous, to do away with the quality of stickiness, which is said by some authors to be produced by an easily decomposed caoutchouc-like substance, and to allow the aqueous extractive matter to ooze out of the material without stirring.

Notwithstanding the constant repetition of cautions in all the text-books, dispensatories, and other pharmaceutical literature respecting the care to be observed about subjecting opium to heat, I do not find that there is any appreciable difference in the yield of morphia when opium has gone through this barbarous process.

Whatever changes may take place among the other proximate constituents is not known, but I am quite satisfied as to the fact that the natural morphia salts, protected by extractive, are not decomposed, or only to a very small extent, by such a heat as is necessary for the desired alteration of the valueless or inert matters contained in opium.

* Read before the American Pharmaceutical Association at San Francisco. From the *National Druggist*. July 15.

The Pharmaceutical Journal.

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CINCHONA AND QUININE PRODUCTION IN INDIA.

IN a blue book just issued, giving various statistics to exhibit the material progress and condition of India during the year 1887-88, the section devoted to agriculture contains some information respecting cinchona cultivation and its results. It appears that the area then under cinchona in the Government plantations of the Darjeeling district in Bengal was 2208 acres, on which were growing 4,851,000 cinchona trees in permanent plantations. It is stated that more than one-half of these trees belonged to the calisaya or quinine yielding variety, and during the year 424,000 trees of this variety were planted out. The proportion of succirubra trees is also stated to be more than one-half of the above number, so that there is evidently some inaccuracy in one or other of these statements. The number of succirubra trees uprooted for their bark was 375,000. The total crop of bark obtained was 290,000 lbs. in a dry state. The whole of that supply, with the exception of 855 lbs., was made over to the factory, which manufactured from it 331 lbs. of quinine sulphate and 6916 lbs. of cinchona febrifuge. Taking the yield of quinine sulphate from succirubra bark at 1·5 per cent., the quantity consumed for producing the quantity above mentioned would be 22,066 lbs., leaving 267,079 lbs. for the cinchona febrifuge, the yield of which would thus amount to about 2·5 per cent. of the bark used. That would be but a poor yield for good succirubra bark, and if it represents the actual contents of alkaloid, the bark must have been of poor average quality. The cost of the plantations is stated to have been 76,700 rupees, but that was irrespective of interest on capital. The money yield of the factory at the rate of 14 rupees per pound for febrifuge and 20½ rupees per pound for quinine was during the year 137,510 rupees on the products issued to the Government department and to the public; but some part of that supply appears to have been drawn from the produce of the previous year, since it was larger than the total quantity of products manufactured, while there was also at the end of the year a stock of bark, more than half calisaya, amounting to 296,000 lbs. It is difficult, therefore, in the absence of further data to arrive at any estimate of the actual relation of the cost of production and return realised.

Mention is made of a new method of manufacturing quinine by steeping the powdered bark in cold oil as having been perfected during the year, and it is said to yield a "particularly good quinine," but no data are given by means of which an idea can be arrived at as to the cost of this method and its efficiency for the extraction of the alkaloid from the bark. It may, however, be pointed out that the price above quoted for quinine sulphate of 20½ rupees per pound would make the quinine about double the price that this article has been sold for in England and America during the last few months. That also is taking the rupee as being equal to only one shilling and sixpence, and so far there does not appear to be any great advantage in the production of quinine sulphate in India.

The area under cinchona in the Government plantations of the Nilgiri district in Madras is stated to be 908 acres, on which were growing 1,740,000 cinchona trees in permanent plantations. This is a smaller number by 198,000 than was returned in the report of the previous year, as part of one plantation had been abandoned and the trees uprooted. The crop for the year amounted to 93,000 lbs. of dry bark, of which 7000 lbs. was issued and the remainder stored, making the total quantity in stock at the end of the year 251,000 lbs. It is the intention to convert this bark into quinine sulphate and cinchona febrifuge, on the plan that has been adopted in the Bengal plantations, and buildings with machinery for that purpose are being erected. The outlay on the plantations during the year is stated to have been 72,160 rupees, but in respect to return, it is merely stated that the 7000 lbs. of bark issued was valued at 1200 rupees. Here again there are no data for any estimate of the relation between cost and return.

The area under cinchona on private plantations is returned at 1355 acres in Bengal, 6444 acres in Madras, and about 2000 acres in Coorg and Mysore. The export of cinchona bark from India has risen from 1,286,900 lbs. in 1886-87 to 1,449,313 lbs. in 1887-88, and to 3,074,098 lbs. in 1888-89.

NEWCASTLE INDUSTRIES.

THOUGH we have already devoted two articles to a *résumé* of the features of interest presented by Newcastle for the instruction and entertainment of visitors to the forthcoming meetings of the British Pharmaceutical Conference and British Association, we venture again to return to the subject in consequence of the receipt of an early copy of a most excellent handbook to the industries of the Tyne district, which has been prepared at the instance of the Local Committee of the British Association. It consists of a series of thirty-one papers by different

authors who have been selected for the purpose as being men who have a knowledge of the subjects they write upon, and with the expectation that in coming years this little volume will prove a useful source of reference. The first chapters of the work are devoted to the agriculture of the district, its railways and harbours. These are illustrated with numerous maps and plans, and contain a large amount of valuable statistical information. Mining and quarrying, engineering and ship-building form the subjects of the next three chapters, after which the works of Sir W. G. Armstrong, Mitchell and Co. are specially dealt with. A short chapter on Electricity, by the Hon. C. A. Parsons, gives an interesting *résumé* of the progress of this science and its applications at the present time, showing how some of its most important developments had their origin at Newcastle and the extent to which the industries arising therefrom are carried on at that place. The metallurgical industries of the district are treated of by Messrs. Charles Lowthian Bell, Cookson, Gatheral, Patinson and Netto; Chemical manufactures by Mr. Stuart; Gas Works by Mr. Hardie; Printing and Paper-making by Messrs. Reid and Richardson. Other chapters describe the Flour Milling, Leather Manufacture, Tanning, Coach-building, Earthenware Manufacture, Photography and Carpet manufacture. Two articles on Cement manufacture, by Messrs. Watson and Spoor, are especially interesting as showing the great progress that has been made in that industry. Then come chapters on Rope-making, Brewing, and Tobacco manufacture, while lastly the decayed industries of flax-spinning, glass-making, fire-clay, hat-making and woollen mills are briefly mentioned as illustrations of the changes that have taken place in the industries of Newcastle and the neighbourhood. Everyone who desires to gain knowledge of the various industries carried on in the district will do well to furnish himself with this useful guide, and great credit is due to the Local Committee for having taken the trouble to provide for its production.

BRITISH PHARMACEUTICAL CONFERENCE.

By the courtesy of the Honorary Secretaries we are enabled to publish the following list of titles of papers which the authors propose to communicate to the British Pharmaceutical Conference during the meeting to be held at Newcastle-upon-Tyne next month :—

Papain as a Digestive Agent Compared with Commercial Pepsin. By A. Ball.

Infusion of Gentian. By W. Johnston.

Note on Tincture of Lemon Peel. By W. Johnston.

Exact Formulæ for the Official One Per Cent. Liquors. By C. A. Macpherson.

Liquor Morphinæ Meconatis. By C. A. Macpherson.

Note on Meconic Acid and the Detection of Opium in cases of Poisoning. By A. H. Allen, F.I.C., F.C.S.

Note on Vermin Killers containing Strychnine. By A. H. Allen, F.I.C., F.C.S.

Ipecacuanha Fluid Extract and Wine (Standardized). By J. O. Braithwaite and J. C. Umney.

Ipecacuanha Wine (British Pharmacopœia). By J. O. Braithwaite and J. C. Umney.

Short Note on the Preparation and Use of a Scale of Small Residues devised to Facilitate the Estimate of Progress in Washing Precipitates, etc. By B. S. Proctor, F.I.C.

Short Note on Tincture of Senna, B.P., intended to Indicate its Want of Medicinal Activity, and to open a Discussion on its Change or Deletion from the Pharmacopœia. By B. S. Proctor, F.I.C.

Note on Ferri et Ammonii Citras. The Presence of Sulphate, etc. By B. S. Proctor, F.I.C.

Casearia Esculenta. By Dr. P. S. Mootooswamy, F.L.S., Tanjore.

The Chemistry of Strophanthus. By Professor T. R. Fraser, F.R.S.

Note on a New Mode of Applying Chloride of Methyl. By W. Martindale, F.C.S.

Medical and Chemical Misconceptions about Lithia. By Louis Siebold, F.I.C., F.C.S.

Chemical Observations on the Root Bark of Euonymus. By W. A. H. Naylor, F.I.C., F.C.S.

Notes on Some New Gums. By T. Maben, F.C.S.

Easton's Syrup. By T. Maltby Clague.

Another death caused by the drinking of carbolic acid in mistake for whiskey from an unlabelled bottle is reported from Edinburgh. *Apropos* of this subject it may be mentioned that the Irish Privy Council has replied to a recommendation of the King and Queen's Colleges of Physicians that carbolic acid should be included in the poison schedule to the effect that it is unwilling to act until a similar step is taken in Great Britain. So that we have Dublin Castle waiting for Downing Street, and Downing Street waiting for a parliamentary lull, and meanwhile carbolic acid continues to claim its victims, and the recommendations of the two authorities appointed by statute to guard the public interests in respect to poisons are ignored.

* * *

The low prices now obtained for cinnamon bark in the market, consequent upon the largely increased exports from Ceylon, has led to the revival of a proposal that the growers should combine to stop the exportation of "chips" from the island, which amounts to about 500,000 lbs. annually. One half of this quantity is estimated to come from the estates of growers sufficiently wealthy to withstand the temporary strain until recouped by the increased returns on account of the quills, and in order to meet the difficulty of the poorer growers it is proposed to combine to buy the remainder at a fair price and use it for distillation purposes in the island. The pure oil obtained would, it is thought, take the place of the cinnamon leaf oil, which is produced to the extent of 80,000 to 100,000 ounces yearly. The leaf oil is seldom manufactured by the cinnamon growers themselves, but as a rule by persons who pay the proprietor of an estate fifty to one hundeed rupees a year for permission to use as many leaves as may be required for a still. This practice it is proposed to abolish, and as a consequence to suppress the distillation of cinnamon leaf oil.

* * *

The *Lancet*, in commenting upon recent legislation in Yucatan, under which medical practitioners will be allowed to keep open pharmacies in that state without the necessity of keeping a qualified assistant, says, "Unfortunately, something like this is occasionally done in this country, where open surgeries are sometimes left in the charge of the proprietor's wife, or some much less competent and more irresponsible person."

British Medical Association.

SECTION OF PHARMACOLOGY AND THERAPEUTICS.

Some Practical Points in the Use of Antacid Remedies in Dyspepsia and Gravel.*

BY SIR WILLIAM ROBERTS, M.D., F.R.S.

The application of chemical knowledge to the treatment of disease is both new and old. In the course of the discussion which is to be presently opened we shall perhaps hear something of the new and more recondite applications of chemistry to therapeutics. What I am going to say, on the contrary, will only deal with old chemistry and old applications; but I hope, nevertheless, to gather on these ancient paths some useful gleanings of a practical character.

There are, perhaps, in the whole range of therapeutics no simpler problems presented to us than those which have reference to the palliative treatment of acid dyspepsia, and the chemical prophylaxis of uric acid gravel. An excess of acid in the stomach is almost as easily neutralized as if it were contained in a bottle in the laboratory. And hyperacidity of the urine is scarcely less under our control, provided we employ a larger dose of the neutralizing agent. But although the objects in view are so simple, and the means of attaining them so well known, there are a number of practical points in carrying out the indicated lines of treatment which are neither simple or well known; and it is to some of these points that I propose to call your attention. For our present purpose alkalizing or antacid agents may be classed into those which are designed to take effect in the stomach, or gastric antacids—and those which are designed to take effect in the kidneys, or renal antacids. The gastric antacids in common use consist of the alkaline and earthy carbonates and lime water. Renal antacids include, in addition to these, the acetates and citrates of potash and soda, which are changed in the primæ vitæ into carbonates of these bases.

GASTRIC ANTACIDS.

Gastric antacids are employed in two distinct classes of cases, namely, in acid dyspepsia, and secondly, in a variety of conditions characterized by great irritation of the stomach, often with vomiting, which we seek to allay by the administration of milk mixed with lime-water.

Antacids for Acid Dyspepsia.—You are all aware that sufferers from acid dyspepsia are in the habit of relieving their pains by the use of antacids. I have elsewhere pointed out that the most advantageous mode of administering antacids in these cases is in the guise of the lozenge. A lozenge, properly used, should be deliberately sucked, and not roughly chewed and swallowed. The process of sucking induces a plentiful flow of alkaline saliva, and the presence in the stomach of this bland demulcent secretion is soothing to the angry mucous membrane. The compilers of the British Pharmacopœia have provided us with two, and only two, antacid lozenges, namely, the troch. sod. bicarb. and the troch. bismuthi. The former contains 5 grains of bicarbonate of soda in each lozenge. It is an effective antacid, but it is not a favourable example of pharmaceutical art. It has a peculiarly nasty, soapy taste, which makes the sucking of it a penance; and this, I presume, is the reason why it has not become popular with dyspeptics. The bismuth lozenge is in every way a better article. It owes its antacid properties to 3½ grains of chalk and 2½ grains of carbonate of magnesia. These quantities are, in saturating power, equal to 10 grains of bicarbonate of soda. This is a full antacid dose, and the chalk and magnesia are practically tasteless, and this is a distinct advantage in regard to the active ingredients of a lozenge. The subnitrate of bismuth, to which this lozenge owes its name, has no antacid properties, and is probably inert. It imparts, however, a slight metallic taste, and communicates to the breath a somewhat disagreeable taint; so that its presence in the lozenge may, I think, be regarded rather as a tribute to the decaying art of polypharmacy than as a really useful addition. The bismuth lozenge has won its way into favour with dyspeptics by sheer merit, and inquiries which I have caused to be made among druggists and lozenge-makers show that the sale of this lozenge is steadily and largely increasing all over the country. A bismuth lozenge without the bismuth would be a nearly perfect antacid lozenge, and I would venture to suggest that some such lozenge should be introduced at the next revision of the British Pharmacopœia.*

Besides these officinal articles, there are largely sold in the shops a variety of lozenges and tablets for the use of dyspeptics. None that I have examined fulfil the conditions of a perfect antacid lozenge. The compressed tablets of carbonate of soda and the soda-mint tablets, although effective as antacids, are so unpalatable that they cannot be properly sucked without disgust, and, indeed, those who use them generally swallow them whole in haste—and thus miss the concurrent flow of saliva, which is distinctly helpful to dyspeptics. Some of the antacid lozenges sold in the shops are flavoured with pungent spices to conceal the taste of the soda. All such adjuncts are obviously a mistake. Pungent spices have a strong tendency to provoke acidity in the stomach; and, moreover, any pronounced flavour is objectionable in an article which is used frequently. The alkaline salts of the Vichy springs have been made into very agreeable lozenges—which are sold in this country in sealed boxes. They owe their antacid properties chiefly to carbonate of soda, but partly also to carbonate of potash and to the carbonates of lime and magnesia. They contain besides a small quantity of sodium chloride, which pleasantly sharpens their flavour. These lozenges have a comparatively feeble saturating power, but owing to their full sapid qualities, they provoke an abundant flow of alkaline saliva, and this renders them effective for the relief of gastric acidity. Were it not for their costliness, I believe these Vichy lozenges would soon get into favour with dyspeptics.

As to the comparative merits of the several antacids employed in acid dyspepsia, there is, perhaps, on the whole not much to choose. Certain differences may, however, be noted. The alkaline bicarbonates have a nauseous taste, and if taken in excess they leave an alkaline residuum in the stomach. This is at least abnormal, and perhaps embarrassing, in an organ which requires the presence of an acid to perform its functions. The earthy carbonates, on the other hand, are tasteless, and, owing to their insolubility, they cannot, when taken in excess, cause the neutral line to be over-passed. Perhaps the most advantageous course would be to vary and change the antacid from time to time.

The question may now be put—Is there any harm in the practice of habitually using antacids for the relief of acid dyspepsia? Do dyspeptics purchase present ease at the cost of some future detriment? My attention has been directed to this point for some years. I

* An Address delivered at the opening of the Section of Pharmacology and Therapeutics, at the Annual Meeting of the British Medical Association, held in Leeds, August.

* Messrs. Squire have at my suggestion carried out this proposal, and have prepared a simple antacid lozenge which contains the same antacid charge as the bismuth lozenge, but excludes the bismuth. It contains also 1 grain of sodium chloride, which sharpens its flavour, and thus promotes the flow of saliva.

have, naturally, regarded a practice so artificial with considerable misgivings. But the more extended my experience has become the more I have been satisfied that, with due precautions, the practice is harmless—and I know of no valid evidence from any other quarter to justify a contrary conclusion. My own experience has been mostly gained from the use of the bismuth lozenges, which I have largely prescribed for a considerable length of time. I have, however, invariably enjoined the following strict rules in regard to their use:—They were not to be used at or near meal times—not sooner than three quarters of an hour or an hour after breakfast, nor sooner than an hour or an hour and a half after dinner; they were not to be used regularly and systematically, but only as the occasion arose, that is to say, when gastric pain was distinctly present, and was producing more discomfort than a man could be reasonably expected to bear who had the easy means of relief ready to his hands; lastly, the use of the lozenges was to be discontinued if their employment did not cut short the pain. This last injunction leads up to the remark that an antacid dose is sometimes a useful means of diagnosis in cases of gastralgia. It is often impossible to decide upon a patient's statements what may be the real nature of the pains complained of. In such a case, if an effective antacid dose fail to give relief it is sure evidence that the pains are not due to gastric acidity.

Lime Water with Milk.—Lime water is used as an antacid in a very important and serious class of cases. It is a very general practice, as you know, when the stomach is intolerant of food, to administer milk with lime water—and often with the happiest results. But in many instances the symptoms are not allayed and the milk is vomited up in hard, sour curds. Failure in these cases is often solely due to the feeble antacid property of the lime water. The saturating power of lime water is really very low. Quicklime dissolves in water only to the extent of about half a grain to the fluid ounce—and this is only equivalent in saturating power to one grain of chalk and to a grain and a half of bicarbonate of soda. To reach an effective antacid dose lime water requires to be given in very large quantities—quantities which are altogether impracticable. Six ounces of lime water are only equal to a single ordinary antacid dose of chalk or bicarbonate of soda. I have repeatedly observed in cases of feeding with milk and lime water that failure was simply due to the feebleness of the antacid charge—and that when a solution of 5 to 10 grains per ounce of bicarbonate of soda was substituted for lime water as an admixture with milk a favourable result was at once obtained, and the vomiting of hard curds arrested.

A useful notion of the relative antacid potency of the several articles in common use as gastric antacids (as sold in the shops) may be obtained from an inspection of the following table:—Ten grains of bicarbonate of soda are taken as a standard antacid dose; and the quantities given of the other articles correspond in saturating value to this standard dose. The results were obtained by direct alkalimetrical determinations, and are here shown in round numbers:—

Table of Antacid Equivalents.

10 grains	sod. bicarb.	=	12 grains pot. bicarb.
,,	,,	=	6 ,, creta præcipit.
,,	,,	=	6 ,, carb. magnesia.
,,	,,	=	3 ,, calcined magnesia.
,,	,,	=	6 fluid ounces lime water.
,,	,,	=	2 fluid drachms liq. potassæ.
,,	,,	=	1 bismuth lozenge B.P.
,,	,,	=	2½ Wyeth's soda-mint tablets.
,,	,,	=	5 Vichy lozenges.

RENAL ANTACIDS.

The use of alkalizing agents for the prevention of uric acid gravel stands on quite as rational a basis as the use of antacids for the relief of acid dyspepsia. It is chemically impossib for uric acid to be deposited in the free state from an alkaline urine; and as we have the means of harmlessly alkalizing the urine at will, we have in our hands, theoretically at least, the absolute power of preventing uric acid gravel. There are, however, a good many practical difficulties in the way. The disposition to uric acid gravel has a certain persistence. It may last intermittently, for weeks, months, and even years, and it would obviously be too great a strain on a treatment which is purely preventive to require that a patient should take antacid remedies in sufficient doses and at sufficiently frequent intervals to maintain the urine continuously alkaline for so long a period of time; nor is this necessary. A study of the normal oscillations of the urine at different periods of the day and night leads to the inference that the liability to uric acid gravel only assumes a morbid intensity during a limited portion of the twenty-four hours. The precipitation of uric acid in the kidneys can only take place when there is a concurrence of several favouring conditions. The flow of urine must be very slow, the secretion must be poor in saline constituents, it must be acid or even hyperacid in reaction, and it must be fairly rich in uric acid. Now these several conditions only coincide at one period of twenty-four hours, namely, during the hours of sleep. The time of sleep is a time of fasting, and therefore a time of hyperacidity of the urine; a time of bodily immobility and recumbency, and therefore a time when the renal stream approaches nearest to absolute stagnation. On the other hand, during the day and the waking hours the recurrence of the meals keep the urine rich in saline ingredients, and at a low degree of acidity, or even renders it for a while actually alkaline; the renal stream is comparatively full and rapid, and its descent from the kidneys is favoured by the force of gravity. During these hours, therefore, the risk of uric acic acid precipitation is reduced to a minimum, even in persons who show a distinct tendency that way; for, as I have repeatedly had occasion to observe, the urine of calculous subjects exhibits exactly the same cyclical diurnal variations as that of healthy persons, though not always to so pronounced a degree.

It follows from these considerations that if we safeguard the night the day may be generally left to take care of itself. This theoretical deduction is fully in accordance with experience in the treatment of uric acid gravel. In the milder cases a single full dose of the alkalizing agent taken at bedtime suffices to prevent the recurrence of the colicky pains and the discharge of uric acid concretions. For this purpose the citrates and acetates seem to be preferable to the bicarbonates. Their effect, I have reason to believe, is more protracted and covers a longer period of time than that of the bicarbonates. The citrate of potash is, on the whole, the best preparation to employ; it has very little taste, and it sits comfortably on the stomach. The dose for an adult should not be less than 40 to 60 grains dissolved in three or four ounces of water. In severer cases a single dose is insufficient, and the early morning urine will still exhibit a morbid disposition to precipitate uric acid. In such cases a second dose should be taken about the middle period of the hours of sleep. This is less difficult to manage with the subjects of gravel than in healthy persons. There is commonly in calculous subjects a certain restlessness, and a certain irritability of the urinary organs, which leads to an increased frequency of micturition, and such persons rarely pass the night without a call to empty the bladder. Advantage should therefore be taken of this break in the continuity of sleep to take the second antacid dose. In this way the entire night and early morning may be effectually guarded.

Cases of uric acid gravel, however, are not always to be got rid of on these easy terms. Now and then

instances are met with in which the perversion is so great that the urine is disposed to deposit almost all the twenty-four hours round, and in which the normal alkaline tide, after meals, seems to be altogether abrogated. Under these circumstances additional doses of the antacid are required to afford the requisite protection. But, so far as I have seen, these extreme conditions only last a short time—a few days at most—and there is then a return to a less urgent state of things. It is, indeed, a marked character of uric acid gravel that it oscillates in intensity—it comes and goes in paroxysms—reminding one of the waviness of gouty phenomena. For this reason it is desirable to frequently note the state of the urine, and to ascertain its greater or less proneness to deposit uric acid, so that the administration of the antacid may be adjusted to the actual needs of the patient. There is no great difficulty about this. If a freshly voided specimen of the urine of fasting—say the urine of the early morning or the urine secreted just before dinner be set aside in a bottle, in a warm place, so as to prevent the separation of the amorphous urates, the imminence of precipitation can be easily observed. If precipitation be morbidly imminent crystals of urid acid will appear—perhaps at once, perhaps in an hour or in a couple of hours. If precipitation be not morbidly imminent crystals will not appear for several hours—perhaps not for two or three days. It is possible in this way to gauge pretty accurately the intensity of the morbid tendency, and to regulate thereby the amount and frequency of the antacid dose—or to decide on its discontinuance.

The essential thing in the prophylactic treatment of uric acid gravel is to guard the urine from precipitating within the precincts of the kidney. And we shall practically have attained our object if we succeed, not in altogether preventing precipitation, but in postponing it until the urine has quitted the kidneys. A postponement for a short time—even half an hour—may make all the difference between a precipitation which is fraught with pain and peril and a precipitation which is practically harmless. Now, the protective effect of the antacid extends in this respect a good deal beyond the point at which the urine is rendered actually alkaline. For although all acid urines of medium density precipitate uric acid sooner or later, the time of the occurrence of that precipitation is immensely influenced by the degree of acidity of the urine. Other things being equal, the more acid the urine the earlier is the precipitation, and the less acid the urine the longer is the precipitation postponed. An antacid effect, therefore, which is too feeble to render the urine actually alkaline may be quite sufficient to depress its acidity to such a degree as shall postpone the time of precipitation until the urine has escaped from the kidneys, and even from the bladder.

There are several important matters in connection with the preventive treatment of uric acid gravel which I am unable to touch upon, such as the regulation of the time and quality of the meals and the general mode of life, the use of other salines besides those which tend to diminish the acidity of the urine, the relations of uric acid to oxalate of lime, and so forth. To expand the subject in these directions would lead me too far. I could not pursue it without entering on some very intricate questions of urinary chemistry—the elucidation of which would require more time than I have now at my disposal—and some of which, moreover, are not yet ripe for profitable discussion. The conditions which determine the occurrence of urinary gravel are still imperfectly understood, and several of the problems connected therewith still await scientific study. The subject is one of great interest, both in regard to its therapeutical tissues and its physiological bearings, and I know of none more likely to yield valuable results to a skilled and patient inquirer.

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ROYAL INSTITUTION OF GREAT BRITAIN.

An Attempt to Apply to Chemistry one of the Principles of Newton's Natural Philosophy.*

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(*Concluded from page* 140.)

The immediate object of this lecture is to show that, starting with Newton's third law of motion, it is possible to preserve to chemistry all the advantages arising from structural teaching, without being obliged to build up molecules in solid and motionless figures, or to apply to atoms definite limited valencies, directions of cohesion, or affinities. The wide extent of the subject obliges me to treat only a small portion of it, namely of *substitutions*, without specially considering combinations and decompositions, and, even then, limiting myself to the simplest examples, which however, will throw open prospects embracing all the natural complexity of chemical relations. For this reason, if it should prove possible to form groups similar, for example, to H_4 or CH_6 as the remnants of molecules CH_4 or C_2H_6 we shall not pause to consider them, because, as far as we know, they fall asunder into two parts, H_2+H_2 or CH_4+H_2, as soon as they are even temporarily formed, and are incapable of separate existence, and therefore can take no part in the elementary act of substitution. With respect to the simplest molecules which we shall select—that is to say, those of which the parts have no separate existence, and therefore cannot appear in substitutions—we shall consider them according to the periodic law, arranging them in direct dependence on the atomic weight of the elements.

Thus, for example, the molecules of the simplest hydrogen compounds—

HF	H_2O	H_3N	H_4C
hydrofluoric acid	water	ammonia	methane

correspond to elements the atomic weights of which decrease consecutively,

$$F=19,\ O=16,\ N=14,\ C=12.$$

Neither the arithmetical order (1, 2, 3, 4 atoms of hydrogen), nor the total information we possess respecting the elements will permit us to interpolate into this typical series one more additional element; and therefore we have here, for hydrogen compounds, a natural base upon which are built up those simple chemical combinations which we take as typical. But even they are competent to unite with each other, as we see, for instance, in the property which hydrofluoric acid has of forming a hydrate, that is, of combining with water; and the similar attribute of ammonia, resulting in the formation of a caustic alkali, NH_3H_2O, or NH_4OH.

Having made these indispensable preliminary observations, I may now attack the problem itself and attempt to explain the so-called structure or rather construction of molecules, that is to say, their constitution and transformations, without having recourse to the teaching of "structionists," but on Newton's dynamical principles.

Of Newton's three laws of motion, only the third can be applied directly to chemical molecules when regarded as systems of atoms among which it must be supposed that there exist common influences or forces, and resulting compounded relative motions. Chemical reactions of every kind are undoubtedly accomplished by changes in these internal movements, respecting the nature of which nothing is known at present, but the existence of which, the mass of evi-

* Delivered Friday, May 31.

dence collected in modern times, forces us to acknowledge as forming part of the common motion of the universe, and as a fact further established by the circumstance that chemical reactions are always characterized by changes of volume or the relations between the atoms or the molecules. Newton's third law, which is applicable to every system, declares that "action is always associated with reaction, and is equal to it." The brevity and conciseness of this axiom was, however, qualified by Newton in a more expanded statement, "the action of bodies upon one another are always equal, and in opposite directions." This simple fact constitutes the point of departure for explaining dynamic equilibrium, that is to say, systems of conservancy. It is capable of satisfying even the dualists, and of explaining, without additional assumptions, the preservation of those chemical types which Dumas, Laurent, and Gerhardt created unit types, and those views of atomic combinations which the structionists express by atomicity or the valency of the elements, and, in connection with them, the various numbers of affinities. In reality if a system of atoms or a molecule be given, then in it, according to the third law of Newton, each portion of atoms acts on the remaining portion in the same manner, and with the same force as the second set of atoms acts on the first. We infer directly from this consideration that both sets of atoms, forming a molecule, are not only equivalent with regard to themselves, as they must be according to Dalton's law, but also that they may, if united, replace each other. Let there be a molecule containing atoms A B C, it is clear that, according to Newton's law, the action of A on B C must be equal to the action of B C on A, and if the first action is directed on B C, then the second must be directed on A, and consequently then, where A can exist in dynamic equilibrium, B C may take its place and act in a like manner. In the same way the action of C is equal to the action of A B. In one word every two sets of atoms forming a molecule are equivalent to each other, and may take each other's place in other molecules, or, having the power of balancing each other, the atoms or their complements are endowed with the power of replacing each other. Let us call this consequence of an evident axiom "the principle of substitution," and let us apply it to those typical forms of hydrogen compounds, which we have already discussed, and which on account of their simplicity and regularity, have served as starting points of chemical argument long before the appearance of the doctrine of structure.

In the type of hydrofluoric acid, HF, or in systems of double stars, are included a multitude of the simplest molecules. It will be sufficient for our purpose to recall a few; for example the molecules of chlorine, Cl_2, and of hydrogen, H_2, and hydrochloric acid, HCl, which is familiar to all in aqueous solution as spirit of salt, and which has many points of resemblance with HF, HBr, HI. In these cases division into two parts can only be made in one way, and therefore the principles of substitution renders it probable that exchanges between the chlorine and the hydrogen can take place, if they are competent to unite with each other. There was a time when no chemist would even admit the idea of any such action; it was then thought that the power of combination indicated a polar difference of the molecules of combination, and this thought set aside all idea of the substitution of one component element by another.

Thanks to the observations and experiments of Dumas and Laurent fifty years ago, such fallacies were dispelled, and in this manner, the same principle of substitution was exhibited. Chlorine and bromine acting on many hydrogen compounds, occupy immediately the place of their hydrogen, and the displaced hydrogen, with another atom of chlorine or bromine, forms hydrochloric acid or bromide of hydrogen. Thus chlorine acts on this principle on gaseous hydrogen—reaction, under the influence of light, resulting in the formation of hydrochloric acid. Chlorine acting on the alkalis, constituted similarly to water, and even on water itself—only, however, under the influence of light and only partially because of the unstability of HClO—forms by this principle bleaching salts, which are the same as the alkalis, but with their hydrogen replaced by chlorine. In ammonia and in methane, chlorine can also replace the hydrogen. From ammonia is formed in this manner the so-called chloride of nitrogen, NCl_3, which decomposes very readily with violent explosion on account of the evolved gases, and falls asunder as chlorine and nitrogen. Out of marsh gas, or methane, CH_4, may be obtained consecutively, by this method, every possible substitution, of which chloroform, $CHCl_3$, is the best known, and chloro-carbonic acid, CCl_4, the most instructive. But by virtue of the fact that chlorine and bromine act, in the manner shown, on the simplest typical hydrogen compounds, their action on the more complicated ones may be assumed to be the same. This can be easily demonstrated. The hydrogen of benzole, C_6H_6, reacts feebly under the influence of light on liquid bromine, but Gustavson has shown that the addition of the smallest quantity of metallic aluminium causes energetic action, and the evolution of large volumes of bromide of hydrogen.

If we pass on to the second typical hydrogen compound, that is to say water, its molecule, HOH, may be split up in two ways: either into an atom of hydrogen, and a molecule of oxide of hydrogen, HO, or into oxygen, O, and two atoms of hydrogen, H, and therefore, according to the principle of substitution, it is evident that one atom of hydrogen can exchange with oxide of hydrogen, HO, and two atoms of hydrogen, H, with one atom of oxygen, O.

Both these forms of substitution will constitute methods of oxidation, that is to say, of the entrance of oxygen into the compound—a reaction which is so common in nature as well as in the arts, taking place at the expense of the oxygen of the air or by the aid of various oxidizing substances or bodies which part easily with their oxygen. There is no occasion to reckon up the unlimited number of cases of such oxidizing reactions. It is sufficient to state that in the first of these oxygen is directly transferred, and the position, the chemical function, which hydrogen originally occupied is, after the substitution, occupied by the hydroxyl. Thus ammonia, NH_3, yields hydroxylamine, $NH_2(OH)$, a substance which retains many of the properties of ammonia.

Methane and a number of other hydrocarbons yield, by substitution of the hydrogen by its oxide, methylic $CH_3(OH)$, and other alcohols. The substitution of one atom of oxygen for two atoms of hydrogen is equally common with hydrogen compounds. By this means alcoholic liquids containing ethyl alcohol, or spirits of wine, $C_2H_5(OH)$, are oxidized till they become vinegar or acetic acid, $C_2H_3(OH)$. In the same way caustic ammonia, or the combination of ammonia with water, NH_3H_2O, or $NH_4(OH)$, which contains a great deal of hydrogen, by oxidation exchanges four atoms of hydrogen for two atoms of oxygen, and become converted into nitric acid, $NO_2(OH)$. This process of conversion of ammonia salts into saltpetre goes on in the fields every summer, and with especial rapidity in tropical countries. The method by which this is accomplished, though complex, though involving the agency of all permeating micro-organisms, is, in substance, the same as that by which alcohol is converted into acetic acid, or glycol, $C_2H_4(OH)_2$, into oxalic acid, if we view the process of oxidation in the light of the Newtonian principles.

But while speaking of the application of the principle of substitution to water, we need not multiply in-

stances, but must turn our attention to two special circumstances which are closely connected with the very mechanism of substitutions.

In the first place the replacement of two atoms of hydrogen by one atom of oxygen may take place in two ways, because the hydrogen molecule is composed of two atoms, and therefore, under the influence of oxygen, the molecule forming water may separate before the oxygen has time to take its place. It is for this reason that we find, during the conversion of alcohol into acetic acid, that there is an interval during which is formed aldehyde, C_2H_4O, which, as its very name implies, is "alcohol dehydrogenatum," or alcohol deprived of hydrogen. Hence aldehyde combined with hydrogen yields alcohol; and united to oxygen, acetic acid.

For the same reason there should be, and there actually are, intermediate products between ammonia and nitric acid, $NO_2(HO)$, containing either less hydrogen than ammonia, less oxygen than nitric acid, or less water than caustic ammonia. Accordingly we find, among the products of the de-oxidization of nitric acid and the oxidization of ammonia, not only hydroxylamine, but also nitrous oxide, nitrous and nitric anhydrides. Thus, the production of nitrous acid results from the removal of two atoms of hydrogen from caustic ammonia and the substitution of the oxygen for the hydrogen, NO(OH); or by the substitution, in ammonia, of three atoms of hydrogen by hydroxyl, $N(OH)_3$, and by the removal of water; $N(OH)_3 - H_2O = NO(OH)$. The peculiarities and properties of nitrous acid, as, for instance, its action on ammonia and its conversion, by oxidation, into nitric acid, are thus clearly revealed.

On the other hand, in speaking of the principle of substitution as applied to water, it is necessary to observe that hydrogen and hydroxyl, H and OH, are not only competent to unite, but also to form combinations with themselves, and thus become H_2 and H_2O_2; and such are hydrogen and the peroxide thereof. In general, if a molecule AB exists, then molecules AA and BB can exist also. A direct reaction of this kind does not, however, take place in water, therefore undoubtedly, at the moment of formation, hydrogen reacts on the peroxide of hydrogen, as we can show, at once, by experiment; and further because the peroxide of hydrogen, H_2O_2, exhibits a structure containing a molecule of hydrogen, H_2, and one of oxygen, O_2, either of which is capable of separate existence. The fact, however, may now be taken as thoroughly established, that, at the moment of combustion of hydrogen, or of the hydrogen compounds, peroxide of hydrogen is always formed, and not only so, but in all probability its formation invariably precedes the formation of water. This was to be expected as a consequence of the law of Avogadro and Gerhardt, which leads us to expect this sequence in the case of equal interactions of volumes of vapours and gases; and in the peroxide of hydrogen we actually have such equal volumes of the elementary gases.

The instability of peroxide of hydrogen—that is to say, the ease with which it decomposes into water and oxygen, even at the mere contact of porous bodies—accounts for the circumstance that it does not form a permanent product of combustion, and is not produced during the decomposition of water. I may mention this additional consideration that, with respect to the peroxide of hydrogen, we may look for its effecting still further substitutions of hydrogen by means of which we may expect to obtain still more highly oxidized water-compounds, such as H_2O_3 and H_2O_4. These Schönbein and Bunsen have long been seeking, and Berthelot is investigating them at this moment. It is probable, however, that the reaction will stop at the last compound, because we find that, in a number of cases, the addition of four atoms of oxygen seems to form a limit. Thus, OsO_4, $KClO_4$, $KMnO_4$, K_2SO_4, Na_3PO_4, and such like, represent the highest grades of oxidation.*

As for the last forty years, from the times of Berzelius, Dumas, Liebig, Gerhardt, Williamson, Frankland, Kolbe, Kekulé, and Butlerow, most theoretical generalizations have centred round organic or carbon compounds, so we will, for the sake of brevity, leave out the discussion of ammonia derivatives, notwithstanding their simplicity in respect to the doctrine of substitutions: we will dwell more especially on its application to carbon compounds, starting from methane, CH_4, as the simplest of the hydrocarbons, containing in its molecule one atom of carbon. According to the principles enumerated we may derive from CH_4, every combination of the form CH_3X, CH_2X_2, CHX_3, and CX_4, in which X is an element, or radical, equivalent to hydrogen, that is to say, competent to take its place or to combine with it. Such are the chlorine substitutes mentioned already, such is wood-spirit, $CH_3(OH)$, in which X is represented by the residue of water, and such are numerous other carbon derivatives. If we continue, with the aid of hydroxyl, further substitutions of the hydrogen of methane we shall obtain successively $CH_2(OH)_2$, $CH(OH)_3$, and $C(OH)_4$. But if, in proceeding thus, we bear in mind that $CH_2(OH)_2$ contains two hydroxyls in the same form as peroxide of hydrogen, H_2O_2 or $(OH)_2$, contains them—and moreover not only in one molecule, but together, attached to one and the same atom of carbon—so here we must look for the same decomposition as that which we find in peroxide of hydrogen, and accompanied also by the formation of water as an independently existing molecule: therefore $CH_2(OH)_2$ should yield, as it actually does, immediately water and the oxide of methylene, CH_2O, which is methane with oxygen substituted for two atoms of hydrogen. Exactly in the same manner out of $CH(OH)_3$ are formed water and formic acid, CHO(OH), and out of $C(OH)_4$ is produced water and carbonic acid, or directly carbonic anhydride, CO_2, which will therefore be nothing else than methane with the double replacement of pairs of hydrogen by oxygen. As nothing leads to the supposition that the four atoms of hydrogen in methane differ one from the other, so it does not matter by what means we obtain any one of the combinations indicated—they will be identical; that is to say, there will be no case of actual isomerism, although there may easily be such cases of isomerism as have been distinguished by the term metamerism.

* Because more than four atoms of hydrogen never unite with one atom of the elements, and because the hydrogen compounds (*e.g.* HCl, H_2S, H_3P, H_4Si) always form their highest oxides with four atoms of oxygen, and as the highest forms of oxides (OsO_4, RO_4) also contain four of oxygen, and eight groups of the periodic system, corresponding to the highest basic oxides R_2O, RO, R_2O_3, RO_2, R_2O_5, RO_3, R_2O_7, and RO_4, imply the above relationship, and because of the nearest analogues among the elements—such as Mg, Zn, Cd, and Hg; or Cr, Mo, W and U; or Si, Ge, Sn, and Pt; or F, Cl, Br, and J and so forth—not more than four are known, it seems to me that in these relationships there lies a deep interest and meaning with regard to chemical mechanics. But because, to my imagination, the idea of unity of design in Nature, either acting in complex celestial systems or among chemical molecules, is very attractive, especially because the atomic teaching at once acquires its true meaning, I will recall the following facts relating to the solar system. There are eight major planets, of which the four inner ones are not only separated from the four outer by asteroids, but differ from them in many respects, as for example in the smallness of their diameters and their greater density. Saturn with his ring has eight satellites, Jupiter and Uranus have each four. It is evident that in the solar systems also we meet with these higher numbers, four and eight which appear in the combination of chemical molecules.

Formic acid, for example, has two atoms of hydrogen, one attached to the carbon left from the methane, and the other attached to the oxygen which has entered in the form of hydroxyl, and if one of them be replaced by some substance X it is evident that we shall obtain bodies of the same composition, but of different construction, or of different orders of movement among the molecules, and therefore endowed with other properties and reactions. If X be methyl, CH_3, that is to say, a group capable of replacing hydrogen because it is actually contained with hydrogen in methane itself, then by substituting this group for the original hydrogen, we obtain acetic acid, $CCH_3O(OH)$, out of formic, and by substitution of the hydrogen in its oxide or hydroxyl we obtain methyl formiate, $CHO(OCH_3)$. These bodies differ so much from each other physically and chemically that, at first sight, it is hardly possible to admit that they contain the same atoms in identically the same proportions. Acetic acid, for example, boils at a higher temperature than water, and has a higher specific gravity than it, while its metamer, formo-methylic ether, is lighter than water, and boils at 30°, that is to say, it evaporates very easily.

Let us now turn to carbon compounds containing two atoms of carbon to the molecule, as in acetic acid, and proceed to evolve them from methane by the principle of substitution. This principle declares at once that methane can only be split up in the four following ways:—

1. Into a group CH_3 equivalent with H. Let us call changes of this nature methylation.
2. Into a group CH_2 and H_2. We will call this order of substitutions methylenation.
3. Into CH and H_3, which commutations we will call acetylenation.
4. Into C and H_4, which may be called carbonization.

It is evident that hydrocarbon compounds containing two atoms of carbon, can only proceed from methane, CH_4, which contains four atoms of hydrogen by the first three methods of substitution; carbonizing would yield free carbon if it could take place directly, and if the molecule of free carbon—which is in reality very complex, that is to say, strongly polyatomic, as I have long since been proving by various means—could contain only C_2 like the molecules O_2, H_2, N_2, and so on.

By methylation we should evidently obtain from marsh gas, ethane, $CH_3CH_3 = C_2H_6$.

By methylenation, that is by substituting group CH_2 for H_2, methane forms ethylene, $CH_2CH_2 = C_2H_4$.

By acetylenation, that is by substituting three atoms of hydrogen, H_3, in methane, by the remnant CH, we get acetylene $CHCH = C_2H_2$.

If we have applied the principles of Newton correctly, there should not be any other hydrocarbons containing two atoms of carbon in the molecule. All these combinations have long been known, and in each of them we can not only produce these substitutions, of which an example has been given in the case of methane, but also all the phases of other substitutions, as we shall find from a few more instances, by the aid of which I trust that I shall be able to show the great complexity of those derivatives which, on the principle of substitution, can be obtained from each hydrocarbon. Let us content ourselves with the case of ethane, CH_3CH_3, and the substitution of the hydrogen by hydroxyl. The following are the possible changes:—

1. $CH_3CH_2(OH)$: this is nothing more than spirit of wine, or ethyl alcohol, $C_2H_5(OH)$ or C_2H_6O.
2. $CH_2(OH)CH_2(OH)$: this is the glycol of Wurtz, which has shed so much light on the history of alcohol. Its isomer may be $CH_3CH(OH)_2$, but as we have seen in the case of $CH(OH)_2$, it decomposes giving off water, and forming aldehyde, CH_3CHO, a body capable of yielding alcohol by uniting with hydrogen and of yielding acetic acid by uniting with oxygen.

If glycol $CH_2(OH)CH_2(OH)$ loses its water, it may be seen at once that it will not now yield aldehyde, CH_3CHO, but its isomer $\overset{CH_2}{O}\!\!<\!\!\overset{CH_2}{}$, the oxide of ethylene. I have here indicated in a special manner the oxygen which has taken the place of two atoms of the hydrogen of ethane taken from different atoms of the carbon.

3. $CH_3C(OH)_3$ decomposed as $CH(OH)_3$, forming, water and acetic acid $OH_3CO(OH)$. It is evident that this acid is nothing else than formic acid, CHO(OH), with its hydrogen replaced by methyl. Without examining further the vast number of possible derivatives, I will direct your attention to the circumstance that in dissolving acetic acid in water we obtain the maximum contraction and the greatest viscosity when to the molecule $CH_3CO(OH)$ is added a molecule of water, which is the proportion which would form the hydrate $CH_3C(OH)_3$. It is probable that the doubling of the molecule of acetic acid at temperatures approaching its boiling point has some connection with this power of uniting with one molecule of water.
4. $CH_2(OH)C(OH)_3$ is evidently alcoholic acid, and indeed this compound, after losing water, answers to glycolic acid, $CH_2(OH)CO(OH)$. Without investigating all the possible isomers, we will note only that the hydrate $CH(OH)_2CH(OH)_2$ has the same composition as $CH_2(OH)C(OH)_3$, and although corresponding to glycol, and being a symmetrical substance, it becomes, on parting with its water, aldehyd of oxalic acid, or the glyoxal of Debus, CHOCHO.
5. $CH(OH)_2C(OH_3)$, from the tendency of all the preceding, corresponds to glyoxylic acid, aldehyde acid, CHOCO(OH), because the group CO(OH), or carboxyl, enters into the composition of organic acids, and the group CHO defines the aldehyde function.
6. $C(OH)_3C(OH)_3$, through the loss of $2H_2O$ yields the bibasic oxalic acid CO(OH)CO(OH), which generally crystallises with $2H_2O$, following thus the normal type of hydration characteristic of ethane.*

Thus, by applying the principle of substitution, we can, in the simplest manner, derive not only every kind of hydrocarbon compound, such as the alcohols, the aldehyde alcohols, aldehydes, alcohol acids, and the acids, but also combinations analogous to hydrated crystals which usually are disregarded.

But even those unsaturated substances, of which ethylene, CH_2CH_2, and acetylene, CHCH, are types, may be evolved with equal simplicity. With respect to the phenomena of isomerism, there are many possi-

* One more isomer, $CH_2CH(OH)$, is possible, that is secondary vinyl alcohol, which is related to ethylene, CH_2CH_2, but derived by the principle of substitution from CH_4. Other isomers of the composition C_2H_4O, such, for example, as $CHCH_3(OH)$, are impossible, because it would correspond to the hydrocarbon $CHCH_3 = C_2H_4$, which is isomeric with ethylene, and it cannot be derived from methane. If such an isomer existed, it would be derived from CH_2, but such products are up to the present unknown. In such cases the insufficiency of the points of departure of the statical structural teaching is shown. It first admits constant atomicity and then rejects it, the facts serving to establish either one or the other view; and therefore, it seems to me, that we must come to the conclusion that the structural method of reasoning, having done a service to science, has outlived the age, and must be regenerated as, in their time, was the teaching of the electro-chemists, the radicalists, and the adherents of the doctrine of types. As we cannot now lean on the views above stated, it is time to abandon the structural theory. They will all be united in chemical mechanics, and the principle of substitution must be looked upon only as a preparation for the coming epoch in chemistry, where such cases as the isomerism of fumaric and maleic acids, when explained dynamically, as proposed by Le Bel and Van't Hoff, may yield points of departure.

bilities among the hydrocarbon compounds containing two atoms of carbon, and without going into details it will be sufficient to indicate that the following formulæ, though not identical, will be isomeric substantially among themselves :—CH_3CHX_2 and CH_2XCH_2X, although both contain $C_2H_4X_2$, or CH_2CX_2 and CHXCHX, although both contain $C_2H_2X_2$, if by X we indicate chlorine or generally an element capable of replacing one atom of hydrogen, or capable of uniting with it. To isomerism of this kind belongs the case of aldehyde and the oxide of ethylene, to which we have already referred, because both have the composition C_2H_4O.

What I have said appears to me sufficient to show that the principle of substitution adequately explains the composition, the isomerism and all the diversity of combination of the hydrocarbons, and I shall limit the further development of these views to preparing a complete list of every possible hydrocarbon compound containing three atoms of carbon in the molecules. There are eight in all, of which only five are known at present.*

Among those possible for C_3H_6 there should be two isomers, propylene and trimethylene, and they are both already known. For C_3H_4 there should be three isomers: allylene and allene are known, but the third has not yet been discovered; and for C_3H_2 there should be two isomers, though neither of them are known as yet. Their composition and structure is easily deduced from ethane, ethylene, and acetylene, by methylation, methylenation, by acetylenation and by carbonization.

1. $C_3H_8 = CH_3CH_2CH_3$ out of CH_3CH_3 by methylation. This hydrocarbon is named propane.
2. $C_3H_6 = CH_3CHCH_2$ out of CH_3CH_3 by methylenation. This substance is propylene.
3. $C_3H_6 = CH_2CH_2CH_2$ out of CH_3CH_3 by methylenation. This substance is trimethylene.
4. $C_3H_4 = CH_3CCH$ out of CH_3CH_3 by acetylenation or from CHCH by methylation. This hydrocarbon is named allylene.
5. $C_3H_4 = \begin{matrix}CHCH\\ CH_2\end{matrix}$ out of CH_3CH_3 by acetylenation or from CH_2CH_2 by methylenation, because $CH_2CH = \begin{matrix}\\ CH\end{matrix}$ CHCH. This body is as yet unknown.
6. $C_3H_4 = CH_2CCH_2$ out of CH_2CH_2 by methylenation. This hydrocarbon is named allene, or iso-allylene.
7. $C_3H_2 = \begin{matrix}CHCH\\ C\end{matrix}$ out of CH_3H_3 by symmetrical carbonization, or out of CH_2CH_2 by acetylenation. This compound is unknown.
8. $C_3H_2 = \begin{matrix}CC\\ CH_2\end{matrix}$ out of CH_3CH_3 by carbonization, or out of CHCH by methylenation. This compound is unknown.

If we bear in mind that for each hydrocarbon serving as a type in the above tables there are a number of corresponding derivatives, and that every compound obtained may, by further methylation, methylenation, acetylenation, and carbonization, produce new hydrocarbons, and these may be followed by a numerous suite of derivatives and an immense number of isomeric bodies, it is possible to understand the limitless number of carbon compounds, although they all have the one substance, methane, for their origin. The number of substances is so enormous that it is no longer a question of enlarging the possibilities of discovery, but rather of finding some means of testing them, analogous to the well-known two which for a long time have served as gauges for all carbon compounds.

I refer to the law of even numbers and to that of limits, the first enunciated by Gerhardt forty years ago, with respect to hydrocarbons, namely, that their molecules always contain an even number of atoms of hydrogen. But by the method which I have used of deriving all the hydrocarbons from methane, CH_4, this law may be deduced as a direct consequence of the principle of substitutions. Accordingly, in methylation, CH_3 takes the place of H, and therefore CH_2 is added. In methylenation the number of atoms of hydrogen remains unchanged, and at each acetylenation it is reduced by two, and in carbonization by four atoms, that is to say, an even number of atoms of hydrogen is always added or removed. And because the fundamental hydrocarbon, methane, CH_4, contains an even number of atoms of hydrogen, therefore all its derivative hydrocarbons will also contain even numbers of hydrogen, and this constitutes the law of even numbered parts.

The principle of substitutions explains with equal simplicity the conception of limiting compositions of hydrocarbons, CnH_2n+_2, which I derived, in 1861,* in an empirical manner from accumulated materials available at that time, and on the basis of the limits to combinations worked out by Dr. Frankland for other elements.

Of all the various substitutions the highest proportion of hydrogen is yielded by methylation, because in that operation alone does the quantity of hydrogen increase; therefore, taking methane as a point of departure, if we imagine methylation effected $(n-1)$ we obtain hydrocarbon compounds containing times the highest quantities of hydrogen. It is evident that they will contain $CH_4+(n-1)$ CH_2, or CnH_2n+_2, because methylation leads to the addition of CH_2 to the compound.

It will thus be seen that by the principle of substitution—that is to say, by the third law of Newton—we are able to deduce in the simplest manner, not only the individual composition, the isomerism, and relations of substances, but also the general laws which govern their most complex combinations, without having recourse either to statical constructions, to the definition of atomicities, to the exclusion of free affinities, or to the recognition of those single, double, or treble ties which are so indispensable to structurists in the explanation of the composition and construction of hydrocarbon compounds. And yet, by the application of the dynamic principles of Newton, we can attain to that chief and fundamental object—the comprehension of isomerism in hydrocarbon compounds, and the forecasting of the existence of combinations as yet unknown, by which the edifice raised by structural teaching is strengthened and supported. Besides, and I count this for a circumstance of special importance, the process which I advocate will make no difference in those special cases which have been already so well worked out, such as, for example, the isomerism of the hydrocarbons and alcohols, even to the extent of not interfering with the nomenclature which has been adopted, and the structural system will retain all the glory of having worked up, in a thoroughly scientific manner, the store of information which Gerhardt had accumulated about the middle of the fifties, and the still higher glory of establishing the rational synthesis of organic substances. Nothing will be lost to the structural doctrine, except its statical origin; and as soon as it will embrace the dynamic principles of Newton, and suffer itself to be guided by them, I believe that we shall attain, for chemistry, that unity of principle which is now wanting. Many

* Conceding variable atomicity, the structurists must expect an incomparably larger number of isomers, and they cannot now decline to acknowledge the change of atomicity, were it only for the examples HgCl and $HgCl_2$, CO and CO_2, PCl_3 and PCl_5.

* 'Essai d'une théorie sur les limites des combinaisons organiques,' par D. Mendeléeff, 2/11 août 1861, 'Bulletin de l'Académie i. d Sc. de St. Pétersbourg,' t. v.

an adept will be attracted to that brilliant and fascinating enterprise, the penetration into the unseen world of the kinetic relations of atoms, to the study of which the last twenty-five years have contributed so much labour and such high inventive faculties.

D'Alembert found in mechanics, that if inertia be taken to represent force, dynamic equations may be applied to statical questions, which are thereby rendered more simple and more easily understood.

The structural doctrine in chemistry has unconsciously followed the same course, and therefore its terms are easily adopted; they may retain their present forms, provided that a truly dynamical, that is to say, Newtonian meaning be ascribed to them.

Before finishing my task and demonstrating the possibility of adapting structural doctrines to the dynamics of Newton, I consider it indispensable to touch on one question which naturally arises, and which I have heard discussed more than once. If bromine, the atom of which is eighty times heavier than that of hydrogen, takes the place of hydrogen, it would seem that the whole system of dynamic equilibrium must be destroyed.

Without entering into the minute analysis of this question, I think it will be sufficient to examine it by the light of two well-known phenomena, one of which will be found in the department of chemistry, and the other in that of celestial mechanics, and both will serve to demonstrate the existence of that unity in the plan of creation, which is a consequence of the Newtonian doctrines. Experiments demonstrate that when a heavy element is substituted for a light one, in a chemical compound—an atom of magnesium in the oxide of that metal, for example, by mercury, the atom of which is $8\frac{1}{3}$ times heavier—the chief chemical characteristics or properties are generally though not always preserved.

The substitution of silver for hydrogen, than which it is 108 times heavier, does not affect all the properties of the substance, though it does some. Therefore chemical substitutions of this kind, the substitution of light by heavy atoms, need not necessarily entail changes in the original equilibrium; and this point is still further elucidated by the consideration that the periodic law indicates the degree of influence of an increment of weight in the atom as affecting the possible equilibria, and also what degree of increase in the weight of the atoms reproduces some, though not all, the properties of the substance.

This tendency to repetition, these periods, may be likened to those annual or diurnal periods with which we are so familiar on the earth. Days and years follow each other: but, as they do so, many things change; and in like manner chemical evolutions, changes in the masses of the elements, permit of much remaining undisturbed, though many properties undergo alteration. The system is maintained according to the laws of conservation in nature, but the motions are altered in consequence of the change of parts.

Next, let us take an astronomical case, such for example as the earth and the moon, and let us imagine that the mass of the latter is constantly increasing. The question is, What will then occur? The path of the moon in space is a wave-line similar to that which geometricians have named epicycloidal, or the locus of a point in a circle rolling round another circle. But in consequence of the influence of the moon, it is evident that the path of the earth itself cannot be a geometric ellipse, even supposing the sun to be immovably fixed; it must be an epicycloidal curve, though not very far removed from the true ellipse, that is to say, it will be impressed with but faint undulations. It is only the common centre of gravity of the earth and the moon which describes a true ellipse round the sun. If the moon were to increase, the relative undulations of the earth's path would increase in amplitude, those of the moon would also change, and when the mass of the moon had increased to an equality with that of the earth, the path would consist of epicycloidal curves crossing each other, and having opposite phases. But a similar relation exists between the sun and the earth because the former is also moving in space. We may apply these views to the world of atoms, and suppose that, in their movements, when heavy ones take the place of those that are lighter, similar changes take place provided that the system or the molecule is preserved throughout the change.

It seems probable that in the heavenly systems, during incalculable astronomical periods changes have taken place and are still going on similar to those which pass rapidly before our eyes during the chemical reaction of molecules, and the progress of molecular mechanics may—we hope will—in course of time, permit us to explain those changes in the stellar world which have more than once been noticed by astronomers, and which are now so carefully studied. A coming Newton will discover the laws of these changes. Those laws, when applied to chemistry, may exhibit peculiarities, but these will certainly be mere variations on the grand harmonious theme which reigns in nature. The discovery of the laws which produce this harmony in chemical evolutions will only be possible, it seems to me, under the banner of Newtonian dynamics which have so long waved over the domains of mechanics, astronomy, and physics. In calling chemists to take their stand under its peaceful and catholic shadow I imagine that I am aiding in establishing that scientific union which the managers of the Royal Institution wish to effect, who have shown their desire to do so by the flattering invitation which has given me—a Russian—the opportunity of laying before the countrymen of Newton an attempt to apply to chemistry one of his immortal principles.

Reviews.

PRACTICAL ORGANIC CHEMISTRY. By SAMUEL RIDEAL, D.Sc. (Lond.), F.I.C., F.C.S., F.G.S., Fellow of University College, London.*

This is a collection of the more important tests and reactions of the common organic compounds, more especially such as are of importance in medicine and pharmacy, and embracing all the substances mentioned in the syllabus of the science examinations of London University. The author has had experience in teaching this subject at University College, and has put his notes together in the form of a small handbook, which seems mainly adapted to the requirements of the student of medicine.

The organic acids occupy the first half of the book, each being briefly described as to properties, sources, formula, etc., and its tests then given, such as are most characteristic and distinctive being marked with an asterisk. In the case of substances included in the British Pharmacopœia, a list of their official compounds or preparations is also appended. About twenty of the more important acids are included, and are grouped according to the action of calcium chloride and ferric chloride. Most of the tests given are those ordinarily met with, but a few new ones are also introduced, *e.g.*, Saul's thymol reaction with tannic, gallic, and pyrogallic acids; there is also a *résumé* of what is known of the constitution and derivatives of uric acid.

The other substances dealt with are the carbohy-

* London : H. K. Lewis. 16mo. i-viii., 1-160.

drates, including dextrose, sucrose, lactose, starches, dextrin, gum arabic, and cellulose; the organic bases, including urea, quinine, cinchonidine, morphine, brucine, strychnine, atropine, cocaine, and coniine; albumen and gelatine, and the alcohols and ethers, chloroform, aldehyd, and glycerine.

There are no exercises in the preparation of any of the compounds mentioned, but as a collection of the tests it is a very useful little book, although it would have been much improved by a more careful revision of the proofs, such statements being made as that "human urine contains about 21 per cent. of urea," and that the acaciæ gummi of the British Pharmacopœia should give no precipitate with ammonium oxalate, though the next paragraph says it is a salt of potassium and calcium.

URINES. DÉPOTS, SÉDIMENTS, CALCULS. Application de l'Analyse Urologique à la Séméiologie Médicale. Par E. GAUTRELET, Pharmacien de la 1re Classe, etc.*

Such is the title of the latest addition to modern French books upon urine. The author claims, and we think with justice, that some of the best work upon this subject has been done during recent years in his country. Certainly those who study urinary matters cannot afford to neglect the chemical work of Méhu or Yvon, or the medical writings of Lecorché, Talamon, Labadie-Lagrave, Bouchard, etc.

M. Gautrelet's volume opens with a thoughtful preface from the pen of Dr. Lecorché, a distinguished authority upon gout. He recognises in impressive terms the importance of correct analysis in the work of the physician, quoting, however, the cautionary dictum of Claude Bernard, that chemical analysis is useless unless considered in connection with the organic and physiological causes which affect the constitution of the liquid. Following Dr. Lecorché's preface, the author, in a short introduction, traces the plan of his work, and takes occasion to address a warning to those physicians who trust too much to a rapid examination of the urine done at the bedside of the patient. In certain acute cases, he admits, useful information is to be obtained from such *uroscopie clinique*, as he calls it; but in chronic diseases the information is incomplete or even not correct. Professor Félix Guyon's advice to his students is appropriately given, and we think it would be greatly to the advantage of successful diagnosis in this country if his words were taken more to heart by English practitioners. "The perfection to which modern science has been brought," said the Professor, in speaking of urinary analysis to his pupils, "gives still more value to the information yielded by a complete analysis. But it is rarely that the physician possesses a sufficient knowledge of chemistry to bring to a successful issue such an operation. It requires, moreover, the expenditure of so much time, and such minute and unremitting attention, which the practitioner could scarcely be expected to devote to it. You will act wisely in confiding such analyses to a professional chemist." This advice from an eminent authority may be clinched by the words of Dr. Lecorché. "The association of the physician with the chemist appears to me to be indispensable for a sound interpretation of the results furnished by elementary analysis." It is worthy of note that our author acknowledges the perfection to which purely clinical analysis has been brought by some practitioners, such as Gubler—and, he might have added, by Oliver in our own country.

The work proper is divided and sub-divided into sections and chapters. Two of the latter with half-a-dozen sub-sections are devoted to an exhaustive, though concisely written account of the anatomy and physiology of the urinary apparatus. These "prolegomena" are followed by a description of the composition and properties of normal urine. In this portion of the volume the writer does not disdain to enter into the most minute details. A good example, which reads curiously to English eyes, may be found on page 53, sub-section I., headed "Saveur." M. Gautrelet tells us that A. Gautier finds normal urine to be bitter, saline and acid in taste, Lereboullet describes it as bitter and slightly saline, L. Gautier calls it bitter, and at the same time saline, whilst Guérin finds it slightly salt and bitter. Our author thinks he can improve upon all this, and pronounces the liquid, with the emphasis of italics, to possess at first a fresh taste, almost immediately replaced by a freely saline, slightly acidulous flavour, and leaving a bitter *arrière-goût*!

The chapters on normal urine are followed by a "second part" devoted to a careful study of the characters and composition of the abnormal fluid. In the first part of his work the author endeavours to establish an exact prototype or truly normal urine, and any deviations from this standard he describes as ab normal. All other writers that we are acquainted with allow a considerable latitude, for instance, in the density of a normal urine, the average range being from about 1·012 or 1·015 to 1·025, or even 1·030. M. Gautrelet, however, considers all deviations from the specific gravity 1·017,8 at 15° C. as removing the liquid from the normal category. It follows from this that he recognizes two abnormal states, one pathological and the other physiological, but non-pathological. The laborious manner in which M. Gautrelet has established his standard reflects very considerable credit upon his intelligence and patience. The results he has obtained, too, we think, will tend to increase the accuracy of semeiological diagnosis. A very full account is given of the numerous rarer bodies that may occur in morbid urine, especial attention being devoted to an enumeration of the best tests by which they may be identified. This section, and that which follows upon the *technique* of urological analysis, show very clearly the author's intimate acquaintance with the capital work that has been done in France during recent years. The spectroscopic, polarimetric and microscopic sections are written with equal care, the latter being enriched by a number of very fairly executed woodcuts of crystals, etc., most of which have, however, already done duty in the French translation of Lionel Beale, published by Messrs. Baillière.

In the analytical portion proper the author is not quite so full as from other parts of the work might have been anticipated. He appears to consider, and perhaps with justice, that he is addressing an audience quite *au fait* with chemical manipulation. Like Méhu, and unlike Neubauer, he adopts the selective and not the encyclopedic principle in describing processes for identification or for estimation. Both these chemists, it will be remembered, gave the fullest details in their power of the reagents and the reactions. M. Gautrelet has a right, however, to claim indulgence, for we take it that the chief object of his work is diagnostic and not merely analytical. The methods described by our author are those which seemed to him to be the most satisfactory, and we see no reason, broadly speaking, to quarrel with his judgment. His article on the separation of the proteids is short, but good. Diabetic glucose he estimates, like many French medical analysts, by the polarimetric method. In this connection, a most interesting table will be found on page 231, showing the effects of the chief reagents upon those bodies which are liable to be confounded with glucose. The ammoniacal cupric test of Pavy, and the elegant bismuthous solution suggested as an

* Paris: J. B. Baillière et Fils, 1889. Pp. i.-viii., 1–452.

improvement on Böttger by Nylander, are not described. Both these tests are now largely used in this country, the latter being chiefly valuable on account of the unmistakable character of the reaction, and of its freedom from reducing effect upon uric acid and creatinine. Following the example of many of his predecessors in this field, M. Gautrelet has devised a ureometer which has several special features. It is founded in principle upon that of Noël, but is intended for the azometric estimation not only of urea, but of uric acid and creatinine. Knop's hypobromite method is made use of, taking note of Méhu's suggestions. The addition of glycerin is recommended to destroy the foam which forms in the process on albuminous urines. In the section on uric acid no notice is taken of the elaborate process of Salkowski, or of the modification by Haycraft, which has been so much used and criticised in this country and in Germany.

The very large third part is devoted to a consideration of urological semeiology, and has the sub-divisions, physiology, diathesis, chronic diseases (copiously illustrated by interesting charts of the composition of the urine) and acute diseases. The whole section possesses more immediate value for the physician than for the chemist. It contains a good deal of original work, and deserves study by those who are consulted by medical men upon obscure points in pathological chemistry. The work is concluded by a useful bibliography which is not, however, quite perfect, and by a table of contents and an index that are fairly complete. The book throughout is written in the clear, terse, scientific style which the language of *nos chers voisins* so admirably suits. The paper and printing are good, although, as might be expected in the first edition of so technical a work, the volume contains a not inconsiderable number of trifling typographical errors—none, as far as we have observed, of serious moment. The woodcuts are generally pretty fairly done, and will be found useful by the student.

In conclusion, we think the book is a decided contribution to the now fairly extensive literature of the subject; and we rise from its perusal with a sense of satisfaction that so capable a work should have emanated from the pen of a pharmacist.

BOOKS RECEIVED.

OFFICIAL HANDBOOK TO THE INDUSTRIES. British Association, Newcastle-upon-Tyne Meeting, 1889. Newcastle: A. Reed, Sons and Co.

A PRACTICAL TREATISE ON MATERIA MEDICA AND THERAPEUTICS. By Robert Bartholow, M.A., M.D., LL.D., etc. Seventh edition, revised and enlarged. London: H. K. Lewis. 1889. From the Publisher.

UEBER CAPILLAR-ANALYSE UND IHRE VERSCHIEDENEN ANWENDUNGEN, sowie uber das EMPORSTEIGEN DER FARBSTOFFE IN DEN PFLANZEN. By Prof. Dr. F. GOPPELSROEDER. From the Author.

FARBELECTROCHEMISCHE MITTHEILUNGEN. By Prof. Dr. GOPPELSROEDER. From the Author.

Obituary.

Notice has been received of the death of the following:—

On the 30th of July, Mr. Alexander Hutton, Chemist and Druggist, High Street, Portobello, N.B. Aged 59 years.

On the 8th of August, Mr. John Jones, Chemist and Druggist, Leeswood, near Mold, Flintshire. Aged 51 years.

On the 11th of August, Helen Montgomery, Chemist and Druggist, Dumbarton Road, Glasgow. Aged 62 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

EVENING CLASSES.

Sir,—I can heartily endorse what "A Registered Student" writes in last week's Journal as to the desirability of the Society's laboratory and lecture rooms being open to students a few evenings a week, say from October to May.

It is a *sine quâ non* for all but a very few to obtain something of systematic training, or rather of guidance into the way of preparing for qualification. And the majority of those who cannot give up six or twelve months entirely to study find their way into the various private schools of pharmacy, some of which are from time to time spoken of in unflattering terms, but which nevertheless supply a demand for evening classes that undoubtedly exists.

Now everyone acknowledges that the tuition of pharmacy and its scientific by-paths at Bloomsbury Square is conducted by the most accomplished professors; and I am certain a large number of students would prefer imbibing knowledge there to seeking it in other schools, were an evening course open to them. It is more than probable, also, that not a few Minor men would push their studies further if this advantage were offered, the sentiment breathed at the Society's School being, so far as outsiders can perceive, the very antithesis of "cram." So that the opening of its doors to other than day students would induce a more widely-developed aspiration to the higher paths of pharmaceutical and chemical science.

London. E. P.

Sir,—As another "Registered Apprentice," I trust last week's letter with regard to evening classes at the "Square" will receive due consideration by the Council.

Ludgate Circus. APPRENTICE.

PHARMACEUTICAL SOCIETY OF IRELAND.

Sir,—I am perhaps rather ate in drawing attention to the letter of R. J. Downes, which appeared in the Journal of June 8. I think many of our members would be glad to see a "Benevolent Fund" instituted in connection with our Society. I would suggest that Mr. Brunker should take the initiative in this matter, and let his name be associated with the movement, and in this way let us, the members of the Pharmaceutical Society of Ireland, express our appreciation of his labours and sacrifices on behalf of the Society.

Cork. JOHN BLAIR.

C. Crook.—*Circœa lutetiana* and *Mentha sativa*.

W. J. Shepperd.—(1) *Argania sideroxylon*: expressed for oil in Morocco. (2) *Hypericum androsœmum*. (3) *Inula dysenterica*. (4) *Mentha aquatica*. (5) *Eupatorium cannabinum*. (6) *Betonica officinalis*.

J. H. Heap.—(1) In one case by election after examination, in the other by election upon nomination of Fellows: for fuller details apply to the Secretaries of the respective societies. (2) If the act is performed by a person whose name is not on the Medical Register nor on the Register of Chemists and Druggists it would be illegal.

T. J.—Apparently *Plantago major*, but a leaf should be sent. This particular form of monstrosity is not common.

Apprentice.—The Preliminary examination is held four times in each year, on the second Tuesday in January, April, July and October. A list of the examination centres may be obtained on application to the Secretary, 17, Bloomsbury Square, W.C.

Inquirer.—According to the 24th section of the Weights and Measures Act it is illegal for a person to have in his possession for use in trade any weight or measure that is not of the denomination of some Board of Trade standard.

"THE MONTH."

Chloralamide.

Under the name "chloralamide" another compound has been added to the number of new hypnotics. It is described as the product of the direct combination of chloral anhydride and formamide in molecular quantities, and is represented by the formula $CCl_3H\langle^{OH}_{NHCHO}$. Accepting this statement as being correct the name has been subjected to some criticism, and it has been suggested that according to analogy the compound would have been more properly named "chloralformamide." Chloralamide forms shining white crystals, soluble in 9 parts of water and in 1½ parts of 96 per cent. alcohol, melting at 115° C., and splitting up on being distilled into the two original constituents (*Pharm. Centralh.*, Aug. 15, p. 494). A similar decomposition takes place when the aqueous solution is heated to a temperature above 60° C.; below 49° C. it will remain unaltered. A solution is not altered by the addition of silver nitrate or by dilute acid, but it is rapidly decomposed by caustic alkalies, and very slowly by alkaline carbonates and bicarbonates. It should therefore not be dispensed in an alkaline liquid, the best medium probably being one that is slightly acid. The taste is said to be "mild, slightly bitter, and not caustic." Chloralamide has been reported upon, among others, by Dr. Hagen and Dr. Hüfler, who give the results of its administration to twenty-eight persons at Erlangen, to whom 118 doses in all were given (*Mun. med. Wochensch.*, July 23, p. 513). Distinct hypnotic effects were always obtained in twenty-six cases, in sixteen of which its action seemed to present advantages over that of other hypnotics, while in the remainder it was about the same. In comparing the new compound with chloral hydrate the preference is given to chloralamide, on the grounds that its taste is more pleasant, its hypnotic action is more powerful, and the disturbances following its use are smaller, slight pain and fullness of the head being observed on only eight occasions. In many cases a dose of 2 grams was sufficient, especially for women, but in more severe cases 3 grams proved more suitable. It was administered in wafers or dissolved in wine, without any difference in its action being noticed.

Physiological Action of Disulphones.

During the past few weeks a considerable amount of space in this Journal has been given up to the publication of Dr. Lauder Brunton's Croonian lectures on the relation of chemical constitution to physiological action, the justification being that some acquaintance with the advance of knowledge in this direction is now almost indispensable to the pharmacist. Another interesting contribution, though more limited in its scope, has appeared in the *Zeitschrift für physiologische Chemie* (July 29, p. 75), consisting of a report on the physiological action of the disulphones, to which group the new hypnotic sulphonal belongs. Several of the compounds examined had not been prepared before, and it must suffice to say in general terms that some of them that passed through the system unaltered into the urine were inert, while of those that underwent decomposition only the compounds containing ethyl groups were physiologically active, the activity increasing directly with the number of ethyl groups. This is instructively shown by the behaviour of the compounds most nearly allied to sulphonal, or diethylsulphon-dimethyl-methane. In this compound two of the four hydrogens of methane are replaced by methyl groups in direct combination with the carbon, and the other two by two sulphon groups each directly linked with the carbon on one side and with an ethyl group on the other side.

$$\begin{matrix}CH_3\\CH_3\end{matrix}\rangle C\langle\begin{matrix}SO_2C_2H_5\\SO_2C_2H_5\end{matrix}$$

Diethylsulphon-dimethyl-methane or Sulphonal.

When methyl groups took the place of the two ethyl groups in this compound, the product, dimethylsulphondimethylmethane, was physiologically inactive, whilst a corresponding compound containing one ethyl group, dimethylsulphon-ethylmethyl-methane, required to be given in twice the quantity to produce the same effect as sulphonal.

$$\begin{matrix}CH_3\\CH_3\end{matrix}\rangle C\langle\begin{matrix}SO_2CH_3\\SO_2CH_3\end{matrix}$$

Dimethylsulphon-dimethyl-methane.

$$\begin{matrix}C_2H_5\\CH_3\end{matrix}\rangle C\langle\begin{matrix}SO_2CH_3\\SO_2CH_3\end{matrix}$$

Dimethylsulphon-ethylmethyl-methane.

An isomer of sulphonal, in which the two ethyl groups were in direct combination with the carbon and the two methyl groups were linked to the sulphon groups, or "reversed sulphonal," corresponded almost exactly with sulphonal in its physiological action, indicating apparently that the sulphon groups take no part in it.

$$\begin{matrix}C_2H_5\\C_2H_5\end{matrix}\rangle C\langle\begin{matrix}SO_2CH_3\\SO_2CH_3\end{matrix}$$

Reversed Sulphonal.

Lastly, diethylsulphon-methylethyl-methane, or "trional," containing one methyl and three ethyl groups, was found to be a distinctly stronger hypnotic than sulphonal, while diethylsulphon-diethyl-methane, or "tetronal," was more powerful still, requiring only half the quantity to produce the same effect as sulphonal.

$$\begin{matrix}C_2H_5\\CH_3\end{matrix}\rangle C\langle\begin{matrix}SO_2C_2H_5\\SO_2C_2H_5\end{matrix}$$

Trional.

$$\begin{matrix}C_2H_5\\C_2H_5\end{matrix}\rangle C\langle\begin{matrix}SO_2C_2H_5\\SO_2C_2H_5\end{matrix}$$

Tetronal.

Trional is described as occurring in shining tables, melting at 76° C., soluble in 320 parts of water at ordinary temperature and freely in alcohol and in ether, the aqueous solution having a distinctly bitter taste. Tetronal occurs in shining tables and prisms, melting at 85° C., soluble in 450 parts of cold water, freely in alcohol, and moderately in ether. It has a camphor-like and bitter taste.

Sulphites and Thiosulphates.

An interesting contribution to the knowledge of sulphites and thiosulphates has been contributed by Herr Schwicker (*Berichte*, xxii., 1728). If it be assumed that sulphurous acid is asymmetrically constituted, corresponding to the formula $H\cdot SO_2\cdot HO$, isomeric double salts with potassium and sodium would be possible, having the formulæ $KSO_2\cdot ONa$ and $NaSO_2\cdot OK$. The first of these would contain the potassium directly combined with the sulphur; and in the second the position would be reversed and the sodium be linked directly with the sulphur. In confirmation that such compounds are possible, it has been found that when a concentrated solution of potassium hydrosulphite (HSO_3K) is saturated with the corresponding quantity of sodium carbonate and the mixture placed over sulphuric acid, hard yellowish crystals separate after a time, having the composition $NaKSO_3+2H_2O$. But when the solution of the double salt is obtained by neutralizing sodium hydrosulphite with potassium carbonate, small yellowish indistinct crystals

separate having the composition $NaKSO_3 + H_2O$. In treating such a double salt with ethyl iodide to form an ethylsulphonate it might be expected that in the ethylsulphonic acid formed the ethyl would be directly combined with the sulphur, displacing the metal that previously occupied that position, so that if the assumption were correct that the two sodium-potassium compounds described were isomeric in the manner indicated, one of them should yield potassium ethylsulphonate and the other sodium ethylsulphonate, according to the equations—

$$Na \cdot SO_2 \cdot OK + C_2H_5I = C_2H_5 \cdot SO_2 \cdot OK + NaI.$$
$$K \cdot SO_2 \cdot ONa + C_2H_5I = C_2H_5 \cdot SO_2 \cdot ONa + KI.$$

By experiment it has been ascertained that, ignoring some bye-reactions, this is practically what takes place. It appears further that these sodium-potassium sulphites can be converted into corresponding isomeric thiosulphates, from one of which ethyl bromide displaces sodium to form potassium ethylthiosulphate, and from the other potassium to form sodium ethylthiosulphate.

Antipyrin and Iodine.

When iodine in dilute solution is added to solution of antipyrin drop by drop, and the mixture shaken, the precipitate formed at first disappears, leaving the liquid colourless until a certain quantity has been added, when the precipitate remains permanently. According to M. Manseau (*Bull. Soc. Pharm. Bord.*, May, p. 148), this point is reached with Knorr's antipyrin when decinormal solution of iodine has been added in the proportion of 6·8 c.c. (=0 08636 gram iodine) to the gram. Almost identical results were obtained with analgésine of French manufacture from different sources; but one sample, of "foreign origin," inferior in appearance and less soluble in water, only absorbed 0·07241 gram of iodine to the gram before the precipitate became persistent. M. Manseau therefore suggests that this reaction affords to the pharmacist a ready means of testing the quality of the substance supplied to him under the name "antipyrin" or "analgésine." The reactions with chlorine and bromine are exactly of the same order and quite as distinct, but the titration solutions are not so easily preserved of uniform strength. The reaction is said also to constitute a delicate test for the presence of antipyrin in urine, the transient character of the precipitate distinguishing it from the precipitates due to iodine compounds with alkaloids, and the formation of an abundant dull red precipitate when the iodine solution is added in the presence of nitric acid distinguishing it from the turbidity characteristic of ferments.

Cinnamylcocaine.

The amorphous alkaloid obtained as a bye-product in the manufacture of cocaine has not yet been thoroughly examined. A short time since Professor Liebermann separated from the portion not readily attacked by potassium permanganate a base that he named "isatropylcocaine," but from the less stable portion no pure compound has hitherto been isolated. The occurrence of cinnamic acid in the decomposition products of this mixture of bases was considered to indicate the probable presence of cinnamylcocaine and that compound has also been prepared synthetically. It is now announced by Dr. Giesel that he has separated cinnamylcocaine from the less stable portion of the raw bases in considerable quantity and readily crystallizable (*Pharm. Zeit.*, Aug. 24, p. 516). The properties of the natural cinnamylcocaine are said to correspond with those of the synthetically prepared compound so far as they have been at present investigated. The characters specially distinguishing it from cocaine are its higher melting point (121° C.) and its decomposition by permanganate, with formation of bitter almond oil; the decomposition with hydrochloric acid takes place quantitatively into ecgonine and cinnamic acid. As this observation therefore establishes the presence in cocoa leaves of a second crystallizable alkaloid, which in virtue of its properties might easily occur as an impurity in commercial cocaine, it may be useful to remember that cinnamylcocaine in consequence of its instability would be readily detected by the permanganate test, whilst the isatropylcocaine, which is not so easily attacked by permanganate, would hardly be found in a well-crystallized preparation. Reference will also be found on another page to the occurrence of a second crystallizable alkaloid in coca leaves.

Erroneous Colour Test for Cocaine.

In a recent communication to the *Pharmaceutische Zeitung* (Aug. 3, p. 471) Herr Goeldner stated that if cocaine hydrochlorate were added to a solution of resorcin in strong sulphuric acid the liquid quickly assumed a magnificent cornflower blue colour, which upon the addition of soda solution was changed to a clear rose colour. This reaction he therefore proposed as a test for the identification of cocaine, using about 0·01 gram of resorcin, 6 or 7 drops of sulphuric acid and 0·02 gram of cocaine hydrochlorate. Other experimenters, however, failed to produce the reaction, and it soon became apparent that for some reason it was limited to Merck's cocaine. It now appears that it is dependent upon the presence of traces of nitric acid. This is admitted in a communication from Merck, who writes (*Pharm. Zeit.*, Aug. 24, p. 515) "Herr Goeldner has in fact discovered a new identity reaction, though not one through which cocaine can be recognized, but a reaction for the detection of minimum traces of nitric acid, which in delicacy exceeds the ferrous sulphate and indigo reactions.

Quinine Arsenate.

Among the quinine salts now pretty frequently prescribed in granules in France is the arsenate, but in the absence of an official formula some uncertainty exists as to the compound that should be used. An examination by Messrs. Champigny and Choay of six samples obtained from different sources showed that the quinine varied from 58 to 74 per cent., the arsenic acid from 21·8 to 35·7 per cent., and the water from 2·5 to 9·9 per cent. (*Journ. Pharm. Chim.*, Aug. 1, p. 99). Experiments were therefore made with salts prepared in different ways, and containing one or two molecules of quinine to the molecule of arsenic acid, as to which was most suitable for its stability and in other respects, and preference is given to a salt represented by the formula $C_{20}H_{24}N_2O_2 \cdot AsH_3O_4 \cdot 2H_2O$. It contains 66 per cent. of quinine, and is obtained in silky needles by dissolving equivalent quantities of quinine hydrochlorate and monopotassic arsenate in hot water, mixing the solutions and boiling, and after cooling, filtering, washing and drying the precipitate, and recrystallizing from dilute alcohol. If instead of monopotassic arsenate the official

disodic arsenate be used, a fairly stable salt is obtained, which is represented by the formula $3C_{20}H_{24}N_2O_2 \cdot 2AsH_3O_4 \cdot 24H_2O$, which also contains 66 per cent. of quinine.

Pichi.

The Chilian drug "pichi" (*Fabiana imbricata*) has been the subject of chemical investigation by different persons, but with somewhat discordant results. According to Dr. Rodriguez, who first called attention to it as a remedy in disorders of the liver and urinary organs (*Pharm. Journ.*, [3], xvi., 542), the leaves and twigs yielded a crystalline fluorescent substance resembling æsculin, together with paviin and fraxin, two other constituents of horse-chestnut bark, a resin and an essential oil. In addition, Dr. Lyons subsequently reported the presence of a bitter alkaloid that he named "fabianine," yielding crystalline salts, and a crystalline neutral body rich in carbon (*Pharm. Journ.*, [3], xvi., 722). Then the drug was examined by Messrs. Nivière and Liotard, who failed to find any traces of an alkaloid or of the neutral crystalline compound, and attributed any therapeutic action it might exercise to the crystalline fluorescent glucoside principle (*Pharm. Journ.*, [3], xviii., 460). More recently (*Amer. Journ. Pharm.*, Aug., p. 405) it has been examined by Messrs. Trimble and Schroeter, using the wood and bark, and they have also failed to detect an alkaloid, but confirm the presence of a fluorescent glucosidal principle, as well as of a crystalline neutral resin soluble in ether, strong alcohol and chloroform, and insoluble in water, which they represent as of no medicinal value, and as having a composition agreeing with the formula $(C_{18}H_{31}O_2)_x$.

Xanthoxylon Senegalense.

Messrs. Giacosa and Soare report upon a chemical investigation of the bark of the root of *Xanthoxylon Senegalense*, or "artar root" (*Chem. Zeit. Rep.*, Aug. 10, p. 220). The bark, which is described as being 2 to 10 mm. thick, red-brown with bright yellow spots when from young roots, or yellow and greyish-yellow from older ones, with a peculiar aromatic odour, and a taste at first aromatic and then acrid and pungent, yielded a fixed oil, a crystalline substance melting at 120°., and three alkaloids. The principal alkaloid, which is named "artarine," and represented by the formula $C_{21}H_{23}NO_4$, was obtained as an amorphous reddish-grey powder, melting with decomposition at 240° C., insoluble in water and benzol, difficultly soluble in chloroform and soluble in boiling 98 per cent. alcohol, ether and acetone. It forms salts of a golden yellow colour, the hydrochlorate being slightly soluble in water, and precipitated from an alcoholic solution by ether. The second alkaloid was obtained in minute quantity as a white powder, forming a pale yellow crystalline hydrochlorate soluble with difficulty in water and alcohol. The third alkaloid, occurring in blood-red needles, soluble in water, was not found in all the samples of bark examined. The neutral crystalline substance, separated from a ligroin extract of the bark, was colourless and tasteless, had the composition $C_{10}H_{10}O_3$ or $C_{14}H_{14}O_4$, and resembled cubebin in many reactions, but did not like it yield acetic and protocatechuic acids when fused with caustic potash. Lastly, another nitrogenous substance was obtained, which crystallized in pale yellow needles, but was not alkaline in reaction.

The euphorbiaceous manchineel or manzanillo tree (*Hippomane Mancinella*), which in the West Indies and South America has a reputation approaching that of the upas in eastern Asia, was not long since the subject of an investigation by A. Betancourt. According to him the acrid juice, which is used as an arrow poison, behaves when given internally as a drastic purgative, with a characteristic diuretic uniform action. It is said to be tasteless, and when administered in small doses to produce neither vomiting nor pain. But a dose of about thirty drops causes a burning sensation in the mouth and stomach, followed by diarrhœa, cramps, profuse sweating, cold in the extremities, and under certain conditions death. As an antidote alcohol is recommended (*Apot.-Zeit.*, Aug. 24, p. 892).

Hippomane Mancinella.

Recently it has been suggested that some of the methods adopted in the analysis of fats might be advantageously applied to the examination of essential oils, and attempts have been made to utilize the acid, ether, saponification and iodine numbers for this purpose. Messrs. Benedikt and Grüssner now propose to add to these the "methyl number," representing the amount of alkyl iodide formed when an essential oil is boiled with hydriodic acid, calculated always as methyl (*Chem. Zeit.*, Aug. 21, p. 1088). A considerable number of the oils examined gave negative results, but it is claimed that the figures obtained warrant the expectation that the method would be useful in such cases as indicating the relative amount of eugenol in the oils of cloves, clove stalks, cinnamon and cinnamon leaves, of anethol in oils of anise, star anise and fennel, and of apiol in oil of parsley.

Testing of Essential Oils.

An interesting observation of the action of chloral hydrate upon a blue glass bottle is reported by Herr Reuter (*Pharm. Centralh.*, Aug. 8, p. 477). The bottle was one in which chloral hydrate had been kept for a long time, and when it came into the possession of Herr Reuter it still contained a small quantity, of which the crystals lying next to the glass were then coloured intensely blue. Upon dissolving these crystals in water and filtering, the blue colour was removed, being due to a substance insoluble in water, but upon adding the residue to some chloral hydrate melted in a water bath it again dissolved and formed a clear blue solution. Further examination of the blue substance showed that it contained traces of nickel, derived, no doubt, from the smalt used as a pigment to colour the glass from which the bottle was made. The chloral hydrate after the removal of the blue substance corresponded to the requirements of the German Pharmacopœia, and when dissolved in ether-alcohol only separated a minute quantity of a white flocculent precipitate that was identified as formate. In this case attention was directed to the occurrence by the colour imparted to the chloral hydrate, but with a white glass this indication would be wanting, and Herr Reuter suggests further investigation as to the conditions under which glass is attacked by chloral hydrate, and whether the therapeutic properties of the latter are ever affected by the contamination.

Action of Chloral Hydrate on Glass.

Some time ago an article went the rounds of the press relating to "eucalyptus honey," said to be secreted by a species of "black bees" in Tas-

mania, and to possess important therapeutic properties (*Pharm. Journ.*, [3], xvii., 1016). After an interval of some months a communication was received from Tasmania, where the honey was alleged to be produced, challenging the existence of the "black bees," and disputing other details of the story (*Pharm. Journ.*, [3], xviii., 252). Apparently ignorant of, or perhaps ignoring the reclamation, M. Maquenne has been engaged in a serious investigation of a sample of "eucalyptus honey," with a view to determining whether it contained a special sugar, and what was the nature of the terpenic carbides and resins said to be present in it. In publishing his results (*Ann. Chim. Phys.*, [6], xvii., 495), M. Maquenne has prefixed to his paper a *résumé* of the original narrative, as if he accepted its statements as correct. Nevertheless, the terms of his conclusions are somewhat equivocal, being to the effect that "eucalyptus honey (*miel eucalypté*) is a mixture of dextrose and levulose, very near to ordinary inverted sugar, to which are added (*auxquels s'ajoutent*) a small quantity of aromatic products and a trace of gummy matter insoluble in alcohol."

Eucalyptus Honey.

In a communication to the *Boston Medical and Surgical Journal* (Aug. 8, p. 130) Dr. Beach points out that the long-continued use of copaiba as an internal remedy would appear to have gradually caused its value in surgical dressings to be lost sight of. Being impressed, while reading a description of "Medical, Surgical and Anatomical Cases," published by Lawrence Heister in London so far back as 1751, with the importance attached by the author to the use of balsam of copaiba on his dressings, Dr. Beach was induced to test the drug for this purpose in the Massachusetts General Hospital. The unusually rapid growth of "a handsome bed of rosy granulations, ready for the grafting process," was so clearly attributable to its effect, that he continued to use it, and it is now the accepted dressing for granulating surfaces in all the wards of the hospital. It is used with cotton waste, instead of charpie, the porous nature of the dressing favouring the ready absorption of any discharge and its disinfection by the copaiba, the odour of which covers the sour smell of any decomposed pus. On the supposition that the value of copaiba as a dressing might depend upon copaivic acid contained in it, Dr. Beach experimented with that substance separately, but with a negative result.

Copaiba in Surgery.

In a report on the relation of the ptomaines or animal alkaloids to some of the infectious fevers, Mr. A. P. Luff publishes the results of a research having for its object to ascertain whether any ptomaines occur in the urine of typhoid and scarlet fever patients (*Brit. Med. Journ.*, July 27, p. 193). The method adopted was to agitate a quantity of urine, previously rendered alkaline by the addition of solution of sodium carbonate, with half its bulk of ether, then, after standing, removing the ethereal solution, filtering and shaking it with solution of tartaric acid, which upon settling carried down with it any animal alkaloid present in the form of a soluble tartrate. This tartaric acid solution was separated from the ether, rendered alkaline with sodium carbonate, and again agitated with half its bulk of ether, the ether being afterwards separated and evaporated, and the residue dried over sulphuric acid. When normal urine was examined in this way no alkaloid was detected; it was therefore assumed that when an alkaloidal substance was obtained by this process from urine of a patient suffering from one of the infectious fevers, it would have been one produced within the system during the course of the fever, care being taken to work only upon urine collected from patients who neither previously nor at the time were taking any alkaloidal or antipyretic medicine. From the urine of a female typhoid patient, collected while the fever was at its height and her temperature ranged from 102·5° to 104° F., Mr. Luff obtained a small quantity of a white crystalline substance, which exhibited all the characters of an animal alkaloid, but which when converted into hydrochlorate gave reactions not corresponding with those given by any previously known animal alkaloid. The urine from a male typhoid patient, passed during the twenty-second and twenty-third days and with the temperature ranging from 99·5° F. to subnormal, gave negative results. Urine collected from scarlet fever patients during the height of the fever yielded a small but appreciable quantity of a white crystalline substance, soluble in water and faintly alkaline, which gave with reagents precipitates that also differed from those given by any other known animal alkaloid.

Fever Ptomaines.

The therapeutic action of senna pods, as differing widely from that of senna leaves, is the subject of an interesting note by Dr. A. W. Macfarlane (*Lancet*, July 27, p. 164). An infusion of senna pods presents the advantage of being almost free from taste and devoid of the characteristic odour and flavour of the leaves. According to Dr. Macfarlane it appears to increase activity in the muscular movements of the whole gastro-intestinal canal, acting quite as much on the colon and rectum as on the small intestine. It is slower in its action than an infusion of the leaves, but equally certain; an ordinary dose producing one motion, seldom more, of soft consistence, in from eight to ten hours, without exciting congestion of the pelvic vessels, increasing hæmorrhagic or menstrual discharges, or causing griping or flatulence. When administered regularly for several nights it promotes natural evacuation of the bowels, so that the quantity taken has to be decreased and eventually stopped. It has been found useful in cases of hæmorrhoids and in constipation of children as well as of the aged. The dose recommended for an adult is from six to twelve pods, and for the young and very aged, from three to six pods, infused in a claret-glassful of cold water for six or eight hours. A liquid extract has also been used with advantage, the dose being from half a drachm to a drachm in a wine-glassful of cold water at bedtime. The fact that the senna "legumes are much milder in their operation than the leaflets," is mentioned by Pereira, while in the 'Pharmacographia' it is stated that "the Arabian and medieval physicians of Europe used both the pods and the leaves, preferring however the former," and that "the pods (folliculi sennæ) are still employed in some countries."

Senna Pods.

At the recent Brazilian Congress of Medicine and Surgery held at Rio Janeiro, Dr. Silva Nunes related his experience with the alkaloid lobeline in asthma. He began

Lobeline.

with one-sixth of a grain given at long intervals, and gradually increased the quantity until six grains were given without producing any toxic effects. Administered subcutaneously it does not produce any local difficulties, and where an immediate action is desirable Dr. Nunes recommends this form of administration. He concludes that lobeline does not possess emetic or nauseating properties, and does not produce the toxic effects attributed to it in the doses he recommends, viz., $\frac{3}{4}$ to 6 grains daily for adults and $\frac{1}{6}$ to $\frac{3}{4}$ grain for children. He states that the cases of asthma treated by him with lobeline have remained permanently cured. He believes that its use is indicated in other convulsive affections, such as tetanus. If Dr. Nunes' results were obtained with the alkaloid in white powder described by Messrs. Lloyd, it would appear that this alkaloid represents a part only of the active properties of the drug.

Kola Nuts.

Surgeon R. H. Firth reports in the *Practitioner* (July, p. 27) the results of a careful study made with the view of ascertaining if the claims made for kola nuts as an efficient substitute for tea and coffee for army purposes were well founded. He has arrived at the conclusion that made into an infusion like tea it is an efficient substitute, particularly for those affected with diarrhœa, by reason of its astringency, but that its alleged antagonistic action to alcoholic sequelæ is not capable of proof. He remarks also that continual mastication of the fresh nut is the best method of using it, and points out that care should be taken that neither *Garcinia Kola* nor the seeds of *Sterculia cordifolia*, which contain no caffeine, should be substituted for it.

Nitrobenzol.

Mr. R. Prosser White has directed attention in the *Practitioner* to the poisonous symptoms experienced by the workmen employed in the chemical factories where nitrobenzol is made. It causes marked anæmia, especially of the mucous membranes, the skin assumes a dirty leaden-blue colour; there is great heaviness and drowsiness, the hands and feet easily become chilled and the extremities cold; the men have an unsteady gait as if drunk, and if they fall cannot pick themselves up, and altogether there is great loss of energy and depression of vitality. The urine becomes darkened and smoke-coloured, or even port wine coloured, and smells slightly of bitter almonds. It is obvious, therefore, that it is important in the interests of toxicologists and medical jurisprudence that these symptoms (which are given in much fuller detail in the *Practitioner*) should be well known, since stupefaction arising from nitrobenzol poisoning might easily be mistaken for drunkenness. In view also of the sale of nitrobenzol under the name of artificial essential oil of almonds and its use as a cheap flavouring agent, the poisonous character of this body cannot be too widely known.

Polygala butyracea.

The African oil seeds used by the natives of the Timné (coast) and of the Korauko (interior) country near Sierra Leone, have been examined by Messrs. Heckel and Schlagdenhauffen, who have also described the plant yielding the seeds under the name of *Polygala butyracea*. The plant is a shrub about 6 or 7 feet high, with linear lanceolate, sessile, distant hairy leaves. It differs from *P. rariflora* in having larger leaves, persistent bracts, and in the shape of the posterior petals, which are straight, elongated, distorted and recurved at the apex. From *P. multiflora*, which has also persistent bracts, it differs in the hairs not being arranged in longitudinal lines on the stem, in the longer leaves, shorter racemes, and in the pedicels shorter than the outer sepals, in the narrower petals, ciliated keel and smooth capsule. The author is, however, ignorant whether the two species alluded to, which are also natives of the country around Sierra Leone, have oily seeds. The seeds of *P. butyracea*, which, as well as the plant, are called in the Timné dialect "maloukang," and "ankalaki" in that of Korauko, are employed by the natives to afford an edible fat. This forms a yellowish buttery mass of an agreeable nutty flavour, which softens at 28° to 30° C., and begins to melt at 35° C., not fusing completely until a temperature of 52° is reached. After melting it remains fluid for some time, and does not begin to solidify until the temperature falls to 33°. Its sp. gr. is 0·904 at a temperature of 35° to 38° C. This fat is contained both in the albumen and cotyledons, but aleurone grains were not detected. The fat was found to consist of 30·5 per cent. of olein, 57·54 per cent. of palmitin, 4·795 per cent of free palmitic acid, and 6·165 per cent. of myristin. Traces of formic and acetic acid were also detected. These seeds appear to be very similar if not identical with those exhibited under the name of malukeh seeds in the Sierra Leone Court at the late Colonial and Indian Exhibition.

Cascara Sagrada.

The temporary scarcity of cascara sagrada appears to be now over, plenty of bark of fair quality being offered in the American market. Dr. Squibb (*Ephemeris*, July, p. 1244) remarks that even when good bark was scarce it could have been bought at 85-90 cents per lb., and that the bark chipped or steamed off at improper seasons was always present in the New York market in abundance at 40-60 cents per lb. Now there are large quantities from Washington Territory and Oregon, as well as from California, offered at 18-20 cents per lb. From specimens of the plant recently sent to this country as that of *Rhamnus Purshiana*, there is reason to suppose that the bark of *R. californica* is also collected under the name of cascara sagrada. Dr. Squibb believes that the bark of *Rhamnus Frangula* is likely to prove a better agent and to prove far more uniform in quality than that of *R. Purshiana*, since it is always obtainable in quantity, being a bye product in the manufacture of gunpowder, the wood being used under the name of dogwood for charcoal. Indeed, it has been the gossip in the New York market that preparations of *R. Frangula* have been offered there as tasteless cascara.

Galactane.

The new vegetable introduced a few years ago by M. Pailleuse under the name "crosnes," and of which the tuberous root-stocks are the edible portions, has recently been described and figured in the *Revue des Sciences Naturelles Appliquées*. An analysis of the roots has been made which shows them to contain 16·5 per cent. of a newly-discovered carbohydrate, a substance allied to dextrin and intermediate between sugar and starch (*Gard. Chron.*, Aug. 10, p. 164), to which the name of "galactane" has been given.

At the recent Congress at Paris specimens of exalgine were exhibited in two forms; the one in

flat prisms like those of bicarbonate of potassium, and the other in needles resembling those of strychnine. The former is said to be crystallized from toluol and the latter from water or spirit. A series of interesting chemicals were shown by the Pharmacie Centrale of Paris, including digitin, digitalin in yellowish powder, digitaline in crystalline powder, quassiin, both amorphous and crystallized. Specimens of adeleine, breine, bryonin, breic and bryonic acids, hydroquinine, dihydroquinine and derivatives of cinchonine, quinidine and cinchonidine, obtained by hydrogenation in acid solution; also emetine, pseudoemetine and ipecacuanhic acid, were shown by Dr. Petresco, of Roumania. There were also specimens of amorphous strophanthin from *S. Kombé* and crystalline strophanthin from the glabrous strophanthus seeds of the Gaboon, and pods and seeds of both species; as well as a large series of new drugs, including many of those most recently introduced. These specimens, which had been carefully mounted and labelled under Dr. R. Blondel's superintendence, were presented by the exhibitors, and are intended to form a nucleus for a materia medica museum for the Therapeutical Society of Paris, which doubtless will rapidly assume considerable importance, since under the auspices of the Ministry of Commerce Dr. R. Blondel will receive specimens of all the drugs shown in the Paris Exhibition for an official report which he is commissioned to make. Dr. Blondel was one of the secretaries of the Congress of Therapeutics and Materia Medica, and it was through his courtesy that the reporter for this Journal was enabled to give summaries of several papers which were taken as read at the Congress, before they were actually published in detail in France.

Exhibits at the Paris Congress.

CINNAMYLCOCAINE IN COCA LEAVES.

BY B. H. PAUL, PH.D., AND A. J. COWNLEY.

In testing coca leaves it has generally been assumed that if the alkaloid obtained was crystallizable from petroleum spirit it could be regarded as cocaine. We have long seen reason to doubt the justice of that assumption, and have met with several samples of coca leaves which would have been valued much too highly if the crystallizable character of the alkaloid from petroleum spirit had been taken as a measure of the amount of cocaine. Quite recently we have examined a sample which gave a large yield of alkaloid, upwards of 1·75 per cent., but containing very little cocaine, though the amount of alkaloid crystallizable from petroleum spirit was nearly ·5 per cent. Upon examination this crystallizable alkaloid was found to give reactions indicating that it was in reality cinnamylcocaine. Thus, for instance, on oxidation with potassium permanganate it gave off abundance of bitter almond oil. Liebermann's conjecture that this base might occur naturally in coca leaves appears therefore to be correct, and this circumstance will have to be taken into account in the examination of coca leaves. The mere fact of the alkaloid obtained being crystallizable from petroleum spirit certainly cannot be relied upon as evidence that it is true cocaine.

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THE OILS OF WINTERGREEN AND BIRCH.*

BY HENRY TRIMBLE AND HERMANN J. M. SCHROETER.

The history of these two oils has recently been written by Dr. E. R. Squibb,† and the papers there referred to from the first in 1842 by Professor Proctor to the last in 1884, by Mr. H. P. Pettigrew, can all be found in the *American Journal of Pharmacy*.

From a perusal of the papers by these two authors and that of Cahours‡ one finds that the oils are similar in physical properties, that they are largely composed of methyl salicylate, that one of them, oil of wintergreen, contains approximately 10 per cent. of a terpene according to Cahours, but only 0·3 per cent. according to Pettigrew, and according to the latter that the oil of birch is composed of methyl salicylate only, but according to Proctor that the two oils are identical. On account of the variance of these authorities, and recent statements about the "Artificial Oil of Wintergreen," we have been led to investigate anew the chemical composition of the oils, and in that way compare them. It is the exception when a product, as simple as oil of birch is described by Pettigrew to be, is produced in nature; such substances are more frequently found to be made up of a series of compounds. With this principle clearly in view, we procured four samples, two of each oil.

Sample I., wintergreen oil, was obtained through the kindness of Mr. C. M. Driggs, of White Haven, Penna., whose acquaintance with the distillers of that district enabled him to vouch for the genuineness of a sample of each.

Sample II., oil of birch, from the same source.

Sample III., oil of wintergreen, from Mr. Underhill, of New Hampshire.

Sample IV., oil of birch, this and sample III. had been a number of years in the collection of Professor J. M. Maisch, and were kindly given by him for this investigation. At least one of them, the wintergreen, was examined by Mr. Pettigrew.

Physical Properties.—The following tabular statement of the specific gravities and boiling points shows a remarkable similarity among the samples in this respect.

Sample	Boiling Point, C.	Specific Gravity at 15° C.
I. Wintergreen .	216°	1·1838
II. Birch . . .	217°	1·1840
III. Wintergreen .	216°	1·1845
IV. Birch . . .	217°	1·1840

Since these data have shown considerable variation at the hands of different investigators, we used every precaution to arrive at correct results, and from them one cannot but conclude that these figures could be of no practical value in distinguishing the oils.

Chemical Composition.—Two methods of saponifying these oils have been proposed, one by boiling for some hours with excess of concentrated potassium hydrate solution, which will be designated the *hot process*, and the other, proposed by Professor J. U. Lloyd,§ by pouring the oil, slowly, with constant stirring, into a concentrated solution of potassium hydrate heated to 82° C.

It was noticed by Procter that when the oil of wintergreen was dissolved in potassium hydrate solution in the cold it formed a solid mass, from which the oil separated unchanged on the addition of hydrochloric acid. We found no separation of the oil after heating to 82° C. as directed by Lloyd, although several trials were made with both methods, and we finally adopted a modification of Lloyd's formula, using about one-

* Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy.—No. 57. From the *Amer. Journ. Pharm.*, August.

† *Ephemeris*, October, 1887, p. 951.

‡ *Ann. Chim. et Physique*, [3], x., p. 327.

§ U. S. Dispensatory, 16th edition, p. 100.

half the potassium hydrate recommended in it, attaching the flask to an upright condenser and heating on a water-bath for one-half hour.

By this method we saponified about 800 grams of each oil. Both oils after saponification possessed a characteristic fragrant odour, entirely distinct from that of the oil. The clear solutions were agitated with purified petroleum ether, b.p. 25° to 45° C., and the process repeated with three portions on each. The aqueous solutions, after final separation from the petroleum ether, were almost free from odour, and were set aside for treatment with acid.

The Hydrocarbons.—The different portions of petroleum ether were mixed, keeping those from the two oils separate, the solvent in part recovered by distillation, and the residues set aside to evaporate spontaneously. When the solutions had been reduced to a small bulk, they were transferred to small tared bottles, and, with stoppers removed, were heated for some hours in a water-bath to constant weight.

The yield was { from oil of wintergreen, 0·3 per cent. „ „ birch 0·447 „

Another portion of each oil was saponified by the *hot process*, in which the flasks containing the mixtures were attached to upright condensers and heated for several hours on sand-baths. The saponified oils were then distilled as long as oily drops separated from the distillates, and each of these distillates agitated with ether. The ethereal solutions were treated as the above petroleum ether extractions and the yield found to be { from oil of wintergreen, 0·22 per cent. „ „ birch, 0·084 „

These residues, with those from the petroleum ether, correspond to the hydrocarbon noticed by Cahours in oil of wintergreen, and named by him *gaultherilene*.

The products from the two oils were similar in odour. They both solidified on standing for a day or two, or at once on cooling. That from wintergreen commenced to melt at 10° C. and was clear at 15° C., but the hydrocarbon from birch did not commence to melt below 18° C. and was clear at a few degrees above that temperature. The variation in yield may now be accounted for by supposing that the hydrocarbon in oil of birch exists in greater quantity, as shown by our method of extracting it, but in the *hot process*, in which distillation was used in the separation of the hydrocarbon, a part of that from the birch, probably not being so volatile, was left behind in the distillation.

Even with the comparatively large amounts of oils used the quantities of the hydrocarbons were necessarily limited, therefore they were reserved for a determination of their chemical composition, rather than risk the liability of loss in determining the specific gravity and boiling point.

It may be said, however, that both were lighter than water, and had boiling points near 200° C. No residues remained on the further application of heat. Portions of each were dissolved in alcohol and the absence of traces of salicylic acid determined by ferric chloride.

Composition.—The hydrocarbon obtained by our method from oil of wintergreen, Sample I., was submitted to combustion with the following results:

0·0981 gram substance gave 0·3122 CO_2 and 0·1048 H_2O.

	Found.	Calculated for $C_{15}H_{24}$.
C	86·79 per cent.	88·23 per cent.
H	11·87 „	11·77 „
	98·66	100·00

Vapour Density.—0·090 gram substance displaced 11·6 c.c. air.

Found 6·73
Calculated for $C_{15}H_{24}$ 7·07

The combustion was repeated with a larger amount of substance, with almost identical results, and another determination of the vapour density of a sample from the same oil by the *hot process* gave 6·90.

The hydrocarbon from oil of birch, sample II., gave the following results on combustion. 0·1142 gram substance gave 0·366 CO_2 and 0·1201 H_2O.

C	87·41 per cent.
H	11·69 „
	99·10

Vapour Density.—0·1121 gram substance displaced 14 c.c. air.

Found 6·95
Calculated for $C_{15}H_{24}$ 7·07

Some of these determinations were duplicated without perceptible variation from the above.

The results point to the existence of gaultherilene in both oils, and that it is a sesquiterpene of the formula $C_{15}H_{24}$. The only doubt we feel, in concluding this, is the possibility of the vapour density being a coincidence, since the hydrocarbon may be composed of two or even more compounds, because it appears to be made up of a solid and a liquid portion.

The Acids.—We next directed our attention to the alkaline solutions which were set aside for treatment with acid, and submitted them separately to the following treatment.

On the addition of chemically pure hydrochloric acid in slight excess, salicylic acid separated. This precipitate was collected on a muslin strainer, washed with a little cold water, pressed, washed, pressed again and recrystallized from boiling water. The washings were concentrated, the acid as far as possible recovered, purified, mixed with the pressed lot and the whole dried at 60° C.

The dry mass was pulverized to reduce its bulk and then macerated successively with three portions of petroleum ether. The latter was partly recovered by distillation and the residue allowed to stand and become cool, when a crop of crystals of salicylic acid separated. After removing these the liquid was allowed to evaporate spontaneously; the crystalline residue from the evaporation, although small in amount, was purified by crystallizing several times from boiling water and petroleum ether, when the crystals became pearly in character, and gave the odour of benzoic acid when dissolved in boiling water. On the addition of ferric chloride solution only faint evidence of salicylic acid was obtained. The crystals from oil of wintergreen by this process melted at 125° C., and those similarly obtained from oil of birch melted at 124° C. It may be recalled that benzoic acid melts at 121·4° C.

The crystals from oil of wintergreen yielded the following results on combustion:—

0·0712 gram substance gave 0·1771 CO_2 and 0·0311 H_2O.

	Found.	Calculated for benzoic acid.	Calculated for salicylic acid.
C	67·84 p. c.	68·85 p. c.	60·87 p. c.
H	4·85 „	4·92 „	4·34 „
O	27·31 „	26·23 „	34·79 „
	100·00	100·00	100·00

Vapour Density.—0·0671 gram substance displaced 13·3 c.c. air.

Found 4·36
Calculated for benzoic acid 4·23
„ „ salicylic acid 4·78

The crystals similarly obtained from oil of birch gave on combustion the following results:—

0·0812 gram substance gave 0·2035 CO_2 and 0·035 H_2O.

C	68·35 per cent.
H	4·79 „
O	26·86 „
	100·00

Vapour Density.—0·0811 gram substance displaced 16·3 c.c. air.

Found 4·30

Calculated for benzoic acid 4·23

The Alcohols.—The original liquid after separation of salicylic acid was repeatedly distilled, and the first portion saved each time in order to recover the alcohol. This was finally macerated with and distilled from four lots of calcium oxide.

The alcohol from wintergreen had the sp. gr. 0·801 and boiled at 67° to 73° C. The alcohol from birch had the sp. gr. 0·8017 and boiled at 67° to 73° C. When submitted to the iodoform test, both quickly gave the characteristic odour, and, after standing, deposited yellow crystals of iodoform, indicating the presence of small quantities of ethyl alcohol.

Artificial Oil of Wintergreen.—This preparation has been manufactured and offered for sale by a few firms in recent years. So long as it is sold for what it really is, no objection can be attached to the sale of it. But the temptation to replace the true oils by the artificial product will grow stronger as the price of the latter becomes lower, and no doubt it is used to mix with them at the present time.

In view of the fact that the oil of birch has in part displaced that of wintergreen, Dr. Squibb* nearly two years ago made some remarks about the similarity of the three, suggesting that oil of birch should be called by its correct name, and that the Pharmacopœia by its present definition is lending its authority to perpetuate the error. These statements have since called forth from others the recommendation that the artificial oil should be made officinal at the next revision of the Pharmacopœia. How far this would be undesirable may appear on examining the following analysis of a representative sample of the commercial artificial product, and reflecting on the present difference between this and either of the natural oils, and the still greater difference that would naturally follow the recommendation of the artificial methyl salicylate by the U.S. Pharmacopœia. If it is not a pure compound now, when it is competing for recognition, what would it degenerate to if it should become established by the recommendation of the Pharmacopœia?

The sample examined by us had a boiling point of 217° C., and a sp. gr. of 1·1833 at 15° C. Immediately on the addition of potassium hydrate the characteristic wintergreen odour disappeared, and a disagreeable phenol-like odour was noticed. Petroleum ether removed nothing from this alkaline solution. On adding chemically pure hydrochloric acid a very bulky precipitate separated. This was collected, pressed, purified and dried, as in the case of the acids from the oils, when it was found to be about four times as bulky as they. In weight, however, it was the same. Its melting point was 150° C. Pure salicylic acid melts at 156° C. The powdered acid was heated with petroleum ether, and the solution, after removing the first crop of crystals, was allowed to evaporate spontaneously.

The residue from this evaporation was much larger than that obtained from the oils, and, after purification, was found to melt at 122° C., or only six-tenths of a degree above benzoic acid. The crystals gave off the characteristic odour of benzoic acid when warmed and when dissolved in hot water, and otherwise corresponded with that acid.

0·1012 gram substance gave 0·2548 CO_2 and 0·0443 H_2O.

	Found.	Calculated for benzoic acid.
C . .	68·67 per cent.	68·85 per cent.
H . .	4·87 „	4·92 „
O . .	26·46 „	26·23 „
	100·00	100·00

* *Ephemeris*, October, 1887, p. 954.

Vapour Density.—0·062 gram substance displaced 12·5 c.c. air.

Found 4·29

Calculated for benzoic acid 4·23

Both the combustion and the vapour density determination were repeated without important variation. We made no exact determination of the proportion of benzoic acid present, but it was not far from 15 per cent. of the total acid precipitated. In the acid precipitated from the oils it was not more than 1 per cent. Great loss necessarily occurred in the process of purification.

Summary I.—Previous investigators have found oil of wintergreen to consist of methyl salicylate and a hydrocarbon, called gaultherilene; and oil of birch to be composed of methyl salicylate alone.

II. We find in addition to methyl salicylate, in both a hydrocarbon of the formula $C_{15}H_{24}$, and small quantities of benzoic acid and ethyl alcohol. The amount of the hydrocarbon is from 0·3 to 0·447 per cent., and it becomes solid on standing a short time or on cooling. It is probably made up of a solid and a liquid portion.

III. The oils are physically and chemically identical, the only difference detected being in the melting point of the hydrocarbons. That from wintergreen melted at from 10° to 15° C., and that from birch at 18° C. This may depend on the time of collecting the plants or on the age of the oils.

IV. A representative sample of artificial oil of wintergreen possessed the physical properties, but not the chemical composition of the natural oils, nor was it pure methyl salicylate.

V. The artificial product, when unmixed with the natural oils, may be identified by the addition of excess of potassium hydrate, when all odour of wintergreen will disappear.

VI. It would be undesirable, in the next U.S. Pharmacopœia, to replace the almost pure natural oils by an impure methyl salicylate of variable and uncertain composition. No reasonable objection can be offered to the designation by the Pharmacopœia, as oil of wintergreen, the product from either of the natural sources.

AGARIC ACID.*

Since the recommendation in 1882 by Dr. J. M. Young of the use of agaracine for suppressing perspiration, it has been subjected to numerous chemical investigations. In 1883, E. Jahns, in addition to other substances, separated a body from white agaric (*Polyporus officinale*), which proved to be identical with the crystalline agaric acid obtained by Fleury in 1870, and with the agaracine of Schoonbrodt. This body is a dibasic, triatomic acid, homologous to malic acid. Its formula is—

$$C_{14}H_{27}(OH)\begin{matrix}COOH\\COOH\end{matrix}\cdot H_2O.$$

Schmieder confirmed these results, and Hofmeister proved that, of the numerous bodies contained in agaric, it was only this agaric acid, or agaracinic acid, which possessed the power of reducing perspiration. In spite of these conclusions, the substances sold in the shops under the names of agaracine or agaric acid are by no means simple bodies. Thus, Hofmeister found that the agaracine of commerce contained agaricol, a substance which was totally inactive, and was to be regarded as a contamination, while the agaric acid contained a mixture of the so-called "red rosin," was the probable cause of the cathartic action of agaric. Pure agaric acid is a white, glistening, light crystalline powder, which under the microscope is found to consist of quadrangular tabular crystals, and when recrystallized out of absolute alcohol, forms groups of needles or rosettes. The melting-point is 138° C.

* From the *Therapeutic Gazette*, August 15.

The free acid is only slightly soluble in cold water, but readily soluble in boiling water, and on cooling is redeposited in a crystalline form. All the salts of this acid in combination with alkalies are readily soluble, but the combinations with the heavy metals, on the other hand, are insoluble. Hofmeister has recently subjected the pure agaric acid to accurate physiological investigation, and his results are reported in the *Therapeutische Monatshefte* for June, 1889. From the similarity of action of agaric acid and atropine on the sweat secretion, it is of interest to determine as to whether this similarity is restricted to this single point, or whether the parallelism extends to other actions.

Of Dr. Hofmeister's results, the following deserve attention from their general interest. In the first place, he found that if agaric acid should perhaps not be included among the list of actively poisonous substances, it was not to be regarded as inert.

Applied locally, marked irritation is produced, which in subcutaneous injection produces marked inflammation, extending to suppuration. An internal administration of doses from 17½ to 15 grains produces vomiting and diarrhœa. In cold-blooded animals it produces gradually increasing paralysis and reduction of activity of the heart. Agaric acid is, however, not capable of antagonizing the action of muscarine,—that is, it will not, like atropine, start the heart of a frog which has been arrested through the action of muscarine. In warm-blooded animals, from the slow absorption, internal administration of the pure acid does not produce any very marked results. In subcutaneous or intravenous injections of the soluble sodium salt, the action is principally exerted on the pneumogastric and vaso-motor centres of the medulla; both centres are at first excited, and then paralysed. As a consequence, there is at first slowing of the pulse and increase of blood-pressure, followed by fall of the latter. Death follows after convulsions, from arrest of respiration; but in animals in which artificial respiration is maintained, death is not prevented, but is then attributable to great reduction of blood-pressure. Unlike atropine, agaric acid possesses no mydriatic action, but when the sodium salt is instilled into the conjunctiva severe irritation is produced, and, indeed, slight contraction of the pupil results, which may, however, be overcome through the use of atropine. The influence of agaracine on the sweat secretion is not central, but depends upon direct action on the secreting apparatus. Irritation of the sciatic nerve in animals under the influence of agaracine does not produce any secretion of sweat, although pilocarpine is even now active. Therefore, the similarity between atropine and agaric acid is confined to the influence of these two drugs on the sweat-glands. The degree of action is, however, different. Thus, Brobsting estimated that the influence of agaricine on the perspiration is twenty times less than that of atropine, and Hofmeister concludes that even this estimation is still too favourable for the agaric acid.

Hofmeister's investigations would seem to indicate that for therapeutic purposes the pure agaric acid alone should be employed, and that when this substance is given internally there need be no fear of vomiting or diarrhœa. In Professor Kahler's clinic doses of ¾ to 2 grains were given repeatedly without any symptoms of poisoning, with the exception of transient nausea. Doses of from ⅓ to ½ grain were exceptionally well borne; and since the power of reducing perspiration only occurs after several hours after the administration, and then persists for twenty-four hours, the employment of repeated small doses is greatly to be preferred to the administration of a single large dose. The subcutaneous injection of the soluble sodium salt is to be avoided, as tending to produce severe local irritation. In this connection we may recall that Dr. Pope, in the *Therapeutic Gazette* for June 15, 1888, noted that doses of ⅛ of a grain in the majority of cases completely controlled the night-sweats of phthisis, even after atropine had failed. Dr. Radcliff also likewise reported in the same number of the *Gazette* several cases of night-sweats which were relieved through the use of this remedy.

SULPHUR IN JAPAN.*

What prevents Japan, and more particularly the Hokkaido, from taking a second place to, or rivalling with, Sicily as a sulphur producing country, are the absence of facilities for increasing the output of sulphur, and for shipping it. At present there is only one place in the Hokkaido where sulphur is worked on any scale, and that is Atosanobori, near Kushiro, on the south-east coast of this island. In last year's trade report various improvements in that district are mentioned, and I may here add a few observations on the quantity of this mineral supposed to exist at that spot, and the present cost of working it. This information I have derived from a practical source, and the figures mentioned may be taken as approximately correct.

At Atosanobori the mine is really a hill or small mountain, part of an extinct volcano. The sulphur covers a considerable portion of the slopes of the hill and of the sides of the old crater. Supposing the ore to be only 4 or 5 feet thick on the surface, there must be at this place over 1,000,000 tons of high class ore. Recent borings (by Japanese) give the thickness of ore as 30′ 00″ in some places, but it is probable, however, that the richness of the ore decreases with the depth below the surface. It would be quite safe to count upon at least 5,000,000 tons of good ore. At present the ore yields over 50 per cent. of pure sulphur, a small portion of it being almost pure. The residue for refining kettles would well repay a second treatment, as it appears to contain a considerable percentage of sulphur, as much as 15 per cent. probably, or about the average yield of the whole of the Sicilian sulphur ore.

The present output from Atosanobori does not exceed 10,000 tons of sulphur per annum (output about 9,000 tons in 1888). The cost of the sulphur free on board at Kushiro would be about $10 (£1 10*s.* 10*d.*).

The advantage that Atosanobori possesses over the Sicilian source of supply is the very much greater richness of the ore, and the fact that the deposit is concentrated at one spot; and for these reasons the cost of mining, refining, and transport should be very much less in the former case than in the latter. On the other hand, Sicily has a material advantage in the lower freights to the Liverpool and New York markets. Notwithstanding this, however, the balance is considerably in favour of the Hokkaido source of supply if well worked.

From a recent report, it appears that the annual production of Sicilian sulphur amounts to about 400,000 tons. This quantity far exceeds any possible output in the near future from the Hokkaido mines, but there is no reason why the more easily worked Zezo sulphur, though in comparatively small quantities, should not also find a ready market in Australia, England and America. Its cost, however, should not exceed more than about half its present cost of £1 10*s.* 10*d.* per ton. Judicious outlay of capital and good management would bring about this result of so much importance to this island. About 9,800 tons were shipped during last year from Kushiro to Hakodate, and about 2,800 tons from Kushiro to Yokohama direct; 1,280 tons went from this port to Yokohama in Japanese steamers. Thus about 4,080 tons were shipped from the Hokkaido to Yokohama presumably

* From a report on the trade of Hakodate, by Mr Acting Consul Bonar.

because there were no vessels to take the sulphur direct to the ports of delivery. Of the 9,800 tons shipped to Hakodate, 3,609 tons went to San Francisco, and with the amount shipped to Yokohama, about half of the 9,800 tons was lying in Hakodate at the end of last year awaiting shipment. These details show more especially the absence of shipping facilities from this port.

Besides Atosanobori there exist in the Hokkaido sulphur deposits at Esau, Kobuye, Iwanai, Itashikeoni on the main island, and Kunashiri, on the island of Etorup. At all these places this mineral has been worked at some time or other, but apparently in such a fitful way as to present no results worth mentioning. I have heard, however, that steps are being taken to work both the Iwanai and Kunishiri mines energetically, and brimstone from the latter mine has been bought at £1 6*s.* 2*d.*, and quoted as low as £1 2*s.* 4*d.* At Iwanai, as at Atosanobori, coal is found in considerable quantities close to the sulphur deposits.

THE VANILLA TRADE OF BORDEAUX.*

One of the most delicate articles of trade upon the Bordeaux market is vanilla, which is imported into France from various countries producing this plant. Vanilla, says Consul Roosevelt of Bordeaux, belongs to the family of orchids, and was first found in the forests of Mexico. It is a plant furnished with thick oblong green leaves; the vine sometimes attains a height of 45 feet. The principal centre of production of vanilla is the littoral of Vera Cruz, and it is also found on the west slope of the Cordilleras, in Java, Mauritius, Seychelles, Tahiti, Cochin China, India, and in some of the islands of the West Indies. The vine in cultivation begins to bear the third year after planting, and continues to bear for thirty years. Each vine annually produces from forty to fifty-five capsules or seed pods. The harvest commences in the month of April and lasts until June; the pods are gathered before arriving at complete maturity. There are two different methods in vogue for preparing vanilla for the market. The first consists in harvesting the capsules after they have lost their green tint. Woollen sheets are spread upon the ground, and when thoroughly heated by the sun, the pods are spread upon the sheets and exposed to the sun for a certain period. The pods are then put into boxes covered by a cloth, and again exposed to the sun. The fruit should become a coffee colour twelve or fifteen hours after this last exposure. If, however, this colour is not obtained, the vanilla is again submitted to the heat of the sun. This process occupies about two months, at the expiration of which the vanilla is packed in tin boxes containing about fifty pods each.

The second process consists in tying together about a thousand pods, and plunging them into boiling water to bleach them, after which they are exposed to the sun for several hours, and then coated with oil or wrapped in oil cotton to prevent the pod from bursting. During the drying, the pod exudes a sticky liquid, which is expedited in flowing by gentle pressure of the pods two or three times a day. In preparing the capsule for market it loses about one quarter its original size. Vanilla is classified in four qualities. The pods of the *primeira*, or first quality, are from seven to nine inches in length, and proportionally large; they possess in greater abundance the characteristic and agreeable perfume which gives to the product its greatest value. The *chica punia* is less fine than the preceding. The *saccate* and *basura* are the smallest. The vanilla vine is at times covered with an efflorescence of a silvery brilliance, producing an essential salt similar to that found in the pod, and which is diffused on the outside of the capsule. This is called vanilla rime, and is in great demand on the Bordeaux market. The quantity of vanilla produced in the French colonies in 1886 was as follows:—Island of Réunion, 598,227 kilograms (kilogram = 2·204 lbs. avoirdupois); Guadeloupe, 37,430 kilograms; St. Marie, Madagascar, 12,743 kilograms; Island of Mayotte, 5,461 kilograms; and Tahiti, 13,586 kilograms. Until 1845, the exportation of vanilla from the Island of Réunion was only about six or seven pounds annually, but by degrees the industry increased until at the present time, owing to the excellent quality and quantity produced, Réunion is an important rival and competitor with Mexico.

* From the *Journal of the Society of Arts*, August.

RADIATING POWER OF FLAMES.*

At a recent meeting of the Berlin Physical Society, Dr. R. Von Helmholtz communicated the results of his experiments on the radiating power of flames. The problem which he had set before himself was to determine the relationship between the radiant energy of flames and the amount of gas consumed for their production. The latter was measured by the fall of the gasometre globe which contained the gas, the former by means of a bolometre, for each of whose scale divisions the equivalent value in heat units had been carefully determined by three different methods. The radiating energy of the flames depended upon a number of conditions which were each severally investigated: as, for instance, the size and shape of the flames, the amount of foreign gases introduced, and the ratio of the amount of oxygen to the amount of gases with which it was mixed. For the purposes of comparative measurements, a moderately high flame was chosen, which produced no smoke and was 6 mm. thick. Luminous flames radiated more energy than non-luminous, and it was proved by an extended series of careful quantitative experiments that the radiating power of the flames was not dependent upon their temperature. From this it follows that Kirchoff's law does not hold good for flames—a result which is, however, quite in accordance with the limitations he put to his law for those cases in which heat is directly converted into radiating energy. In the case of flames it must be borne in mind that chemical affinity comes additionally into play; the speaker entered fully into the influence of this upon the radiation of energy, and endeavoured to make it clear by means of an extremely interesting hypothesis. After this he stated the numerical data which he had obtained for both luminous and non-luminous flames, produced with a series of gases—hydrogen, carbonic oxide, methane, coal gas, methyl alcohol, etc. Starting as a basis with Julius' statement that the products of combustion are the only criteria of the amount of radiation, and hence calculating the radiating energy of the flames, he obtained values which corresponded very closely in most cases with those actually observed. Finally he calculated the total useful effect which can be obtained as radiant energy from the gases which are being consumed in the production of the flame. From this he arrived at the interesting result that it is far more economical to use the gases for driving a dynamo which supplies incandescent lamps, and to utilize the energy radiated from the latter, than to burn the gases and utilize the energy which is radiated out from their non-luminous flames.

POISONOUS CONSTITUENT OF LACTARIUS PIPERATUS.

MM. Chodat and Chuit have succeeded in obtaining from this poisonous laticiferous fungus which is not uncommon in oak and beech woods in autumn a substance with a very acrid taste to which they give the name of *piperone*. It is soluble in alcohol, ether and chloroform, and melts at 100° C. The substance appears to have distinctly toxic properties.

* From the *Scientific American*, August 17, 1889.

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REPORT OF THE INLAND REVENUE COMMISSIONERS.

AMONG the numerous papers presented to Parliament in the course of a session, the annual report of the Commissioners of Inland Revenue is one of those usually containing information of special interest to the chemist and druggist, whose multifarious business covers many of the articles referred to in it. In the thirty-second report, dealing with the year ending March 31 last, one of the principal items is spirit, which yielded £12,879,153 out of £25,474,403 collected by the excise, the British spirit charged with duty in the United Kingdom amounting to 27,273,186 gallons. This showed a decrease of £149,000 as compared with the previous year, but it is believed that the falling off in the quantity of British spirit brought to charge in England is connected with the increased entry of plain foreign spirit, principally German, for consumption and methylation. It is estimated, however, that the average consumption of British spirit as a beverage in the United Kingdom has again decreased, the quantity per head being given as 0·693 gallon, while in the previous year it was 0·704 gallon. One noticeable fact is that the quantity of spirit in bond has considerably increased,—from 76,511,109 gallons in 1888 to 81,088,758 gallons in 1889,—but this increase is believed to be mainly due to the augmented demand for matured spirit. For this reason, among others, there has been a slight increase in the quantity of spirit produced, notwithstanding the falling off in the duty paid. The number of distilleries at work during the year ending September 30, 1888, was in England, 10, in Scotland, 127, and in Ireland, 29; and it is estimated that they used as material 838,037 quarters of malt, 1,021,381 quarters of unmalted grain, 210,621 cwts. of molasses, 38,317 cwts. of sugar, and 10,374 cwts. of "jawarree." This jawarree is an Indian grain that appears for the first time as a serious item in these records. The quantity of spirit exported during the year ending March 31 last was 3,470,244 gallons, being an increase on the previous year, while on the other hand duty was paid in the same twelvemonths upon 1,686,501 proof gallons of plain foreign spirit entered for consumption. The returns relating to methylated spirit show that its employment in the arts and manufactures is steadily increasing, the quantity received into warehouse for methylation in the twelve months having been 2,960,904 gallons, or an increase of 193,412 gallons. There is a slight decrease in the number of detections of illicit distillation, of which Ireland is credited with the lion's share,—1739 out of 1781; but one infraction of the law in this direction, discovered at Birmingham, was on an extensive scale, for which penalties amounting to £5000 were imposed. Another large item in the excise returns is the duty on beer, the net receipts reaching £8,938,438, being the largest amount received in any year since the imposition of the duty in 1880. The total quantity of beer on which duty was paid was 28,644,798 barrels, but out of this 537,168 barrels were exported on drawback. Imported beer only amounted to 26,267 barrels and spruce beer to 1765 barrels.

The report includes the usual interesting table of the estimated consumption in the year 1888 of spirit, wine, beer, tea, coffee and cocoa per head of the population, the calculation being based upon an estimated population of 37,453,574. From this table it appears that although, as already mentioned, there was during the year 1888 a slight fall in respect to British spirit,—from 0·704 to 0·693 gallon per head,—an increase in the quantity of foreign and colonial spirit consumed from 0·220 to 0·243 gallon per head raised the gross total of spirit drunk from 0·920 to 0·936 gallon per head. Foreign wine shows a falling off absolutely and relatively, the figures being 13,417,272 gallons against 13,593,999 gallons in 1887, and 0·358 gallon per head against 0·366 gallon. Beer production, notwithstanding the increase previously mentioned, has hardly kept pace with the growth of the population, the fall being from 0·747 barrel per head in 1887 to 0·744 barrel in 1888. Turning now to the non-alcoholic beverages it may be said at once that each of these shows an increase in consumption. The quantity of tea used was 185,416,238 lbs., or 4·950 lbs. per head of the population, against 183,561,835 lbs., or 4·948 lbs. per head, in the previous year. Coffee partly recovered from the heavy fall in consumption in 1887, the figures for 1888 being 30,551,634 lbs., or 0·815 lb. per head. In connection with this article it may be mentioned that there was again a marked decrease in the quantity of chicory charged with duty, as well as in the number of coffee mixture labels issued, and an opinion is expressed by the department that the reduction in revenue in this direction is attributable to the growing unpopularity of coffee mixtures and substitutes for coffee. Cocoa is the item that continues to show the greatest increase, the quan-

tity used in 1888 amounting to 18,215,019 lbs., or 0·486 lb. per head, against 16,100,473 lbs., or 0·434 lb. in 1887.

The increase under the head of receipts for patent medicine stamps is again very large, the total amount being no less than £202,305, or £10,900 more than in the previous year. In addition 22,285 patent medicine vendors' licences were issued, or an increase of 685, bringing in a sum of £5,571. England is answerable for 20,720 of these licences and Scotland for the remaining 1565, Ireland escaping the impost altogether. Methylated spirit retailers' licences numbered 9238 and brought in £4741, and 906 licences to chemists to use stills represented £464. Lastly, the certificates of registration of alkali and other works fell from 3579 to 3250.

THE LABORATORY AT SOMERSET HOUSE.

The report by the Principal of the Laboratory at Somerset House, which is appended to the report of the Inland Revenue Commissioners just issued, shows that Dr. Bell and his assistants have again had a busy year. The number of samples analysed in the year ending March 31 is stated as 44,996, or 5722 more than in the previous year. This increase is attributed principally to the carrying out of the Act limiting the amount of water allowed in manufactured tobacco, and also to the additional facilities recently afforded to wholesale druggists for the exportation on drawback of medicinal tinctures of British make. The extent to which this latter regulation is appreciated by the wholesale trade is shown by the fact that although it had only been in existence four months at the date of the report no less than 662 samples had been examined, and it is believed that the step taken will result in an important development of British trade. In enforcing the limit of moisture in tobacco 15,788 samples were examined, besides 166 for other adulterations. Among the latter were several samples containing coca leaves, taken from a seizure of foreign cut tobacco and cigarettes in London, which had been imported apparently in ignorance that the law does not permit the sale under any conditions in this country of tobacco when mixed with the leaves of any other plant. The beer industry, as usual, contributed a large number of samples, both in the form of wort taken from the brewers and finished beer taken from publicans. Many of the latter showed that the bulk from which they had been taken had been tampered with, either by dilution with water or weaker beer, or by the addition of sugar, proving that considerable sophistication of beer is still carried on, especially in London. Herb and ginger beer also were examined to ascertain whether the spirit present exceeded the amount that could be sold without a licence, and in 55 out of 191 samples it was found that the amount of proof spirit exceeded 3 per cent., and it ranged even as high as 9·7 per cent. In 276 cases members of the staff had to attend to give evidence in support of prosecutions for defrauding the revenue, in 261 of which convictions were obtained and penalties amounting to £3125 awarded. One of the cases dismissed arose out of the sale of meat and malt wine without a licence, but it is pointed out that other magistrates have taken a different view of the law and that the Recorder of Bradford has held on appeal that such wine is not entitled to exemption from licence duty.

Among the important duties performed by the chemists at Somerset House is their action as referees in cases of disputed analyses in prosecutions under the Sale of Food and Drugs Act. There were 54 samples referred in the year, 32 being milk and the others consisting of butter, lard, spirits and pepper. In 39 cases the certificate of the local analyst was confirmed, and in the others the evidence was deemed insufficient to support the allegations made. In five cases where the local analysts had reported the presence in samples of lard of 15 to 30 per cent. of vegetable oil and beef stearin their certificates were confirmed, the vegetable oil being as a rule that derived from cotton seed. One sample of pepper contained 15 per cent. of starch.

A large number of samples are also analysed every year for the Board of Trade, India Office, and Admiralty Department, this work constituting a valuable check upon contractors. Thus out of 15 samples of vinegar examined for the Admiralty only 7 were approved, 4 not being genuine, 2 below strength and 2 not only weak, but containing salicylic acid. The India Office, however, appears to be as badly served as any. For instance, the "zinc white," "red lead" and "lemon chrome" supplied to it were found to contain from 15 to 26 per cent. of heavy spar or sulphate of barium ; litharge contained 19 per cent. of impurities, and chloride of tin 60 per cent. of sulphate of magnesium. Eosin, intended for red ink, was adulterated with 28·5 per cent. of peroxide of iron, and a sample of "essence of beef" consisted of 95·6 per cent. of water and only 4·4 per cent. of solid matter.

NEW INTERPRETATION ACT.

The Interpretation Act which during the week has gone through its final parliamentary stages, and now awaits the royal assent, has for its object to consolidate certain enactments relating to the meaning of words in Acts of Parliament and to carry further the policy of Brougham's Act by enacting general rules as to construction to be observed in the absence of provisions to the contrary. In it the word "person," which has been such a stumbling-block in the administration of the Pharmacy Act, is referred to in two places. In the second section it is provided that "in the construction of every enactment relating to an offence punishable on indictment or on summary conviction, whether contained in an Act passed before or after the commencement of this Act, the expression 'person' shall, unless the contrary intention appears, include a body corporate." This provision, being retrospective in its action, would therefore appear to be applicable to corporations in respect to offences mentioned in the seventeenth section of the Pharmacy Act, 1868. In the twentieth section it is provided that "in every Act passed after the commencement of this Act, the expression 'person' shall, unless the contrary appears, include any body of persons corporate or incorporate."

BRITISH PHARMACEUTICAL CONFERENCE.

We have been informed by the London Honorary Secretary of the Conference that the following papers have been promised for the Newcastle meeting, in addition to those of which the titles were published last week :—

Paper on Strophanthus Plants. By T. Christy, F.L.S.

Wild Cherry Bark and its Preparations. By L. W. Hawkins.

Note on the effect of using Nitrous Vitriol in the Manufacture of certain Aerated Waters. By T. Pattinson, F.I.C., F.C.S.

Negative Evidence of Lead in Drinking Water. By R. Reynolds, F.I.C., F.C.S.

Note on Hyphosphorous Acid as a Solvent for Strychnine and Morphine. By H. W. Jones, F.C.S.

Extract of Stramonium. By A. W. Gerrard, F.C.S.

American Pharmaceutical Association.

Active Constituents of Rhamnus Purshiana. (*Cascara Sagrada.*)*

BY AUG. C. ZEIG, PH.C.

Rhamnus Purshiana is a native of California, or more properly speaking, of the Pacific slope. Its name was given in honour of Frederick Pursh, the renowned Prussian botanist, who in 1814 gave it a full description which fixed its place in botany, his investigation having been made upon specimens obtained directly from the habitat.

This drug was first brought to notice by Dr. Bundy, and was called "cascara sagrada" by the early Mexican settlers in California, the term meaning holy bark. It is now principally known in the Western States as chittem bark.

A good deal has been said of late in the various journals of pharmacy concerning this drug, as well as some of its galenical preparations. The high price which it has commanded in the drug market the past year induced a great rush in gathering the same, and has had a great tendency to bring on the market a drug much inferior in quality, by having been gathered out of season, and again it has had a tendency to bring on the market a substitute or adulterant (a species of of alder, as F. A. Beckett says), which, although quite similar to cascara in appearance and taste, is of no value whatever as an aperient, for it does not contain the active constituents present in cascara sagrada.

As to the chemical constituents of *Rhamnus Purshiana*, I shall call attention to what investigators have contributed to our knowledge through their reports in the various journals of pharmacy. Professor A. B. Prescott gives in the *American Journal of Pharmacy* for 1879 (see list of references at the close of the article), the results of his investigations, both microscopic and otherwise, among which he reports the presence of three resins,—a brown, a yellow and a red resin,—a crystallizable body, three vegetable acids, as tannic, oxalic and mallic acid, both a fat and a volatile oil, wax and starch. In addition to this, Professor Wenzell states in the *Pharmaceutical Journal* of 1886, that he has obtained a substance, which he describes as being of a deep orange-red colour, namely a glucoside.

Messrs. Meier and Webber report in the *American Journal of Pharmacy* of last year, as the result of their investigation, the presence of a vegetable ferment, glucose and traces of ammonia, while Dr. Eccles reports, in the *Druggists' Circular* for 1888, having discovered the presence of an alkaloid which he states he has separated from the fluid extract and precipitated with Mayer's reagent.

Its extensive use in practice, especially in the form of the fluid extract, has amply confirmed that the drug possesses decided laxative properties. Furthermore it is set forth by some and denied by others that it also possesses tonic properties. To which of these constituents just enumerated could the laxative and tonic powers of cascara be due?

Messrs. Parke, Davis and Co. were kind enough to send me a sample of the drug, and I undertook to estimate the quantity of each of the different resins present and by physiological experiment ascertain as to which is the most active. Furthermore I undertook to make out a working formula for obtaining the resin in a concentrated form.

The method suggested by Mr. Wise, in the *Western Druggist*, was first employed for the separation of the three resins. A fluid extract was prepared using strong alcohol as a menstruum. To this fluid extract was added an equal volume of ether, the mixture agitated and allowed to stand for twenty-four hours.

The ethereal liquid was then decanted and strained, the precipitate washed, dried and weighed. The product consisted of a red resin, soluble in alcohol and insoluble in ether. The amount of this resin obtained from 114 gms. of drug was 6·15 grams, which by physiological experiment appeared to be quite inert.

The ethereal liquid was next evaporated to a somewhat syrupy consistence, 70 per cent. alcohol was added, and the whole allowed to stand for some time. The alcoholic solution was then strained and the precipitate washed and dried. This precipitate consisted of a yellowish brown resin, odorless, but having a slight bitter taste. The quantity obtained from 114 gms. of drug was 1·23 grams. By physiological experiment this portion showed itself quite inert.

The strained alcoholic solution obtained as stated in last paragraph was then evaporated to dry syrupy consistence, and slowly decanted into water acidulated with hydrochloric acid. The liquid was now strained, the precipitate washed and dried. This consisted of a third resin, of a dark brown colour, giving an intense purple with potassium hydrate, having a somewhat bitter taste, and an odour much like the odour of the drug. Physiological experiment showed that it is the most active resin of the drug.

The next thing in view was to obtain some cheap and practical formula for obtaining this resin in a concentrated form. The method suggested by Mr. Wise for separating the resins is open to but one especial objection, namely, that of being too expensive a method, as it employs the use of a large quantity of ether as a precipitant. Various other precipitants were tried instead of ether, but without success. Finally I found that by using dilute alcohol as a menstruum in percolating the drug, very little of the inert resin is dissolved, and the use of ether as a precipitant may be avoided. As a formula for obtaining the active resin I would recommend the following :—

Rhamnus Purshiana, No. 40 powder	8 ounces.
Dilute alcohol, Water	each q. s.
Hydrochloric acid	2 fl. drachms.

Moisten the powder with 8 fluid ounces of dilute alcohol, and pack it firmly in the cylindrical percolator, add enough dilute alcohol to saturate the powder and leave a stratum above it. When the liquid begins to drop from the percolator close the lower orifice, and having closely covered the percolator, macerate for 24 hours. Then allow the percolation to proceed, gradually adding dilute alcohol until 12 fluid ounces of percolate are obtained, or until it produces but a slight turbidity when dropped into acidulated water.

* Read before the Pharmaceutical Association at the San Francisco meeting, June, 1889. Reprinted from the *Pharmaceutical Era*, August, 1889.

Evaporate off the dilute alcohol upon a water-bath until the percolate is reduced to a syrupy consistence, and pour it slowly with constant stirring into 8 fluid ounces of water containing the hydrochloric acid. Let stand until the precipitate has subsided, then decant the supernatant liquid and wash the precipitate three times by decantation with fresh portions of cold water. Spread it on a strainer, and having pressed out the liquid, dry the resin by exposure to air at a gentle heat. This resin dissolves in potassium hydrate, giving an intense purple colour, which disappears upon acidulating with hydrochloric acid, when the resin is again precipitated, and may in this manner be obtained devoid of bitterness. Five grains of this resin, a bitter resin, had a marked laxative effect upon an adult.

Now as to the glucoside mentioned, which, according to Messrs. Meier and Webber seems to be peculiar to *Rhamnus Purshiana*, as these authors were unable to determine its presence in *Rhamnus Frangula* as found in the market, it may be regarded as one of the important constituents of the drug and the source of an intensely bitter principle (Meier and Webber), to which no doubt the tonic property is due. It may, according to the above authors, be obtained in quite a pure state for examination by making an aqueous percolate of the drug and precipitating with a solution of subacetate of lead. The excess of lead may be removed by passing hydrogen sulphide into the solution, precipitating the lead as a sulphide, and filtering. This filtrate shows decided chemical change when boiled with sulphuric or hydrochloric acid, giving off a peculiar odour. When examined with the aid of a microscope there is visible an oily and a resinous substance with small crystals distributed through it. This resinous substance appears to be soluble in alcohol or potassium hydrate, and insoluble in water. With potassium hydrate it turns a reddish brown. As the glucoside is capable of decomposition when treated with acids in a test tube, it would likewise be capable of decomposition in the gastric juice of the stomach (Meier and Webber), which contains two-tenths of 1 per cent. of hydrochloric acid.

The resins, as has been stated before, may be obtained devoid of bitterness, while the glucoside is in itself not bitter (Meier and Webber), but is the source of the bitter principle when treated with acids, therefore it appears possible that there may be made a preparation of cascara sagrada quite tasteless, yet containing all the active constitutents to which both laxative and tonic properties are due.

The following is a list of references on the constituents of *Rhamnus Purshiana* (Cascara Sagrada).

Prescott, 1879: 'New Preparations,' Detroit, iii., 27; *Am. Journ. Pharm.*, li., 165; *Archiv. der Pharm.*, [3], xv., 547.

Wenzell, 1886: *Pharm. Rundschau*, iv., 79; *Proc. Am. Pharm. Assoc.*, xxxiv., 462.

Limousin, 1886: *Pharm. Journ. Trans.*, [3], xv., 615.

Wise, H., 1885: *Western Druggist*, vii., 125.

Eccles, R. G., 1888: *Druggists' Circular*, page 54, March. '*Proc. Am. Pharm. Assoc.*,' xxxvi., 402.

Schwabe, P., 1888: *Archiv der Pharm.*

Meier and Webber, 1888: *Am. Journ. Pharm.*, lx., 87; *Proc. Am. Pharm. Assoc.*, xxxvi., 400.

Fuge, H. D., 1889: *Pharm. Journ. Trans.*, [3], xviii., 736 (galenicals.)

Notes on Salicylic Acid, its Isomers and Homologues.*

BY BERNHARD C. HESSE, PH.C.

The object is to ascertain some ready and practical method for the determination of the isomers and homologues of salicylic acid present in this article when made from carbolic acid.

Synopsis.

I. Estimation of the CO_2 evolved when the acids are heated—

1. With lime;
2. With concentrated HCl; and
3. With concentrated H_3PO_4.

II. Determining the amount of U. S. P. HCl required to discharge the colour produced by Fe_2Cl_6.

III. Determining the amount of NH_3 required to neutralize the acids.

IV. By the use of $CuSO_4$ solution—

1. In the presence of alkali hydrates;
2. With the use of HCl to destroy the green colour produced in solution of salicylates.

V. Comparison of these methods as well as others on a commercial sample, with interpretations.

VI. Tabular view of the leading features of the six acids liable to be in salicylic acid when made from carbolic acid.

VII. References and literature.

I. Estimation of the CO_2 evolved when the acids are heated

(1) With lime.

This depends on the fact that when salicylic acid and its homologues are heated with lime, they yield their corresponding phenols and CO_2.

The object was to decompose salicylic acid by means of lime and heat; then to estimate the amount of CO_2 retained by the lime. This was attempted but once, when its defects became so obvious that it was given up.

These defects were as follows: first, that the amount of CO_2 previously combined with the lime was very considerable and variable; second, that the absorption of CO_2 by the lime would be very variable, and dependent in a great measure on circumstances and conditions. One estimation was made which gave altogether too high results.

(2) When heated with concentrated hydrochloric acid.

This depends on the fact that when salicylic acid, its isomers, and its homologues, are heated with HCl they yield their corresponding phenols and CO_2. The temperatures of decomposition are for

Orthohydroxybenzoic acid .	140° to 145° C.
Metahydroxybenzoic acid. .	a very high heat
Parahydroxybenzoic acid . .	135° to 145° C.
Cresotic acid 1:2:3. . . .	210° C.
Cresotic acid 1:2:4. . . .	170° C.
Cresotic acid 1:2:5. . . .	180° to 185° C.

The operation was as follows:—Place a weighed quantity of salicylic acid in a flask with an excess of concentrated HCl. Connect this flask with another smaller flask containing H_2SO_4, which is to take up moisture and phenol.

The tube from the first flask is to be about one-quarter inch above the surface of the H_2SO_4. This flask is then connected with a $CaCl_2$ tube containing concentrated H_2SO_4 to take up any phenol which may have escaped the H_2SO_4 in the flask. This $CaCl_2$ tube was connected with a U tube containing granulated $CaCl_2$, and this with another $CaCl_2$ tube containing in one arm $CaCl_2$, and in the other $CuSO_4$ (anhydrous) and pumice stone. Then came the potash bulbs followed by a $CaCl_2$ tube containing soda-lime and $CaCl_2$, and finally a bottle aspirator. But it was found that HCl could not be used, because it was all dissipated before even 80° C. was reached.

(3) Concentrated H_3PO was next employed with satisfactory results. This acid decomposes salicylic acid at 120° C., but no statement could be found as to its action on the isomers and homologues. It was found that the decomposing flask could be heated

* Read before the American Pharmaceutical Association at the San Francisco meeting, June, 1889. Reprinted from the *Pharmaceutical Era*, August, 1889.

very well in a copper water bath lined with pieces of asbestos felt. In the following table are expressed the theoretical amounts of CO_2 which different mixtures of salicylic and cresotic acids should yield when decomposed into phenol and CO_2.

Per cent. of salicylic acid.	Per cent. of hydroxytoluic acid.	Wt. of CO_2 from 1 gram of the mixture.	Wt. of CO_2 from 15 grams of the mixture.	Per cent. of salicylic acid.	Per cent. of hydroxytoluic Acid.	Wt. of CO_2 from 1 gram of the mixture.	Wt. of CO_2 from 15 grams of the mixture.
100	0	0·3196	4·7940	45	55	0·3031	4·5465
95	5	0·3181	4·7715	40	60	0·3016	4·5240
90	10	0·3166	4·7490	35	65	0·3001	4·5015
85	15	0·3151	4·7265	30	70	0·2986	4·4790
80	20	0·3136	4·7040	25	75	0·2971	4·4565
75	25	0·3121	4·6815	20	80	0·2956	4·4340
70	30	0·3106	4·6590	15	85	0·2941	4·4115
65	35	0·3091	4·6365	10	90	0·2926	4·3890
60	40	0·3076	4·6140	5	95	0·2911	4·3665
55	45	0·3061	4·5915	0	100	0·2901	4·3515
50	50	0·3046	4·5690				

On trying this method with a salicylic acid made from oil of wintergreen by saponifying with KOH, decomposing the soap with HCl and recrystallizing three times from hot water and twice from alcohol, but without treatment with animal charcoal, the following results were obtained:—

Amount of acids taken in grams.	CO_2 obtained.	CO_2 obtained figured to the amount from 1 gram.	Difference plus or minus from 0·3196	Per cent. of CO_2 obtained 0·3196 = 100 per cent.	Interpretation of results according to table above.
I. 1·0105	0·3048	0·30163	−0·0033	94·408	60 per cent. cresotic acid.
II. 0·4275	0·2135	0·49473	+0·17513	154·8	—
III. 0·312	0·1130	0·3621	+0·0425	113·29	—
IV. 0·9922	0·3005	0·3028	−0·0168	94·74	Between 55 and 60 per cent. of cresotic acid.
V. 1·0000	0·3003	0·3030	−0·0166	94·806	Ditto.

From the above table it will be seen that experiments I., IV. and V. are about 6 per cent. too low and that among themselves they agree quite closely. This low yield of CO_2 can only be explained by the fact that the acid used was in very large crystals, which may have mechanically retained some impurities which simple recrystallization could not remove. Experiments II. and III. are very much too high. This may be explained by the fact that the apparatus "sucked back," during the operation, drawing some sulphuric acid from the drying flask into the decomposing flask. The sulphuric acid charred some of the salicylic acid and the resulting carbon reduced the sulphuric acid to SO_2, which was absorbed in the KOH bulbs and weighed as CO_2. Attention has been called to this point in 1880 by B. Vangel.*

In the interpretation of the results in the above table it was assumed that the isomers and homologues would also be decomposed at 180° to 200° C., to which temperatures the flask was heated. When this was tried on a commercial sample yielding by acidimetry, as proposed by Mr. E. E. Ewell, figures corresponding to 35 or 40 per cent. of cresotic acids, 191·4 milligrams of CO_2 were obtained from one gram of the sample.

This is too low even though the acid be pure hydroxytoluic acid. But if this CO_2 is now calculated into salicylic acid 600·28 mgms. will be obtained as the amount of salicylic acid in one gram of the acid taken. This corresponds to 60·028 per cent. almost in accordance with the results obtained by acidimetry. Attention is called to the statement of B. Vangel,* that when salicylic acid is heated with syrupy H_3PO_4, it decomposes at 120°; at 159° a portion of the undecomposed acid sublimes. It was found that a very large amount of crystals had sublimed to the top of the flask, when 88° had been reached. In two other cases sublimation was observed at 42° C. and 55° C. In the first case the phosphoric acid was poured so as to have the salicylic acid on its surface as much as possible, and in the second case the acids were well intermixed.

It was also found that when a commercial acid was subjected to heat in a drying-oven, sublimation began at about 73° C., and when 90° C. had been reached the sublimate had become very large in quantity. These results practically confirm those of Mr. Ewell.† It is perhaps worthy of notice that the sulphuric acid retained all the phenol, and only once in thirteen instances did any phenol get into the KOH bulbs, as was attested by bromine water after the excess of alkali had been neutralized.

II. Determining the amount of U. S. P. HCl. required to discharge the colour produced by Fe_2Cl_6.

When salicylic acid is treated with Fe_2Cl_6 a purple colour results, which is discharged by HCl, $HC_2H_3O_2$, and other acids. On these facts experiments were made to base some method of estimating the amount of salicylic acid present in mixtures of its isomers and homologues. These acids react with Fe_2Cl_6, as follows:—

Ortho-hydroxybenzoic acid .	a violet colour.
Meta-hydroxybenzoic acid .	no colour.
Para-hydroxybenzoic acid .	yellow precipitate.
Cresotic acid 1 : 2 : 3 . . .	intense violet.
Cresotic acid 1 : 2 : 4 . . .	intense violet.
Cresotic acid 1 : 2 : 5 . . .	blue violet.

Experiments were made as follows:—

A solution of salicylic acid, containing 2 mgms. of acid to each c.c. was made up; also a solution of Fe_2Cl_6 containing 66·6 per cent. of Fe_2Cl_6 and some U. S. P. HCl., sp gr. 1·16 and containing 31·9 per cent. of absolute HCl.

Ten c.c. of the salicylic acid solution were placed in a flask and five drops of Fe_2Cl_6 solution added; HCl was then run in from a burette until the liquid became a clear yellow colour. The following results were obtained:—

With 5 c.c. of salicylic solution 0·7 c.c. HCl were used.
„ 10 c.c. „ „ 1·4 c.c. „ „ „
„ 15 c.c. „ „ 2·1 c.c. „ „ „

Then an unknown number of c.c. of the salicylic solution was taken and titrated in the same manner. The results are as follows:—

Given.	Found.
6·0 c.c.	6·07 c.c.
4·0 c.c.	4·01 c.c.
3·5 c.c.	3·58 c.c.
9·5 c.c.	9·56 c.c.

These results are all a little too high, but if duplicates could have been worked they might have been a little closer. Then experiments were made to ascertain what influence a change in the relation between the amount of salicylic acid present and the liquid volume would have. In this case the liquid volume remained constant, namely, 10 c.c.; the amount of Fe_2Cl_6 remained constant also, namely 5 drops. In the table annexed are given the results of these experiments. In the ratio between salicylic acid and HCl, salicylic acid is taken as unity:—

* *Berichte*, xiii., 356.

† *Pharm. Journ.*, [3], xix., 328.

Milligrams of salicylic acid taken.	One-tenth c.c. of U. S. P. HCl used	Ratio between salicylic acid taken and HCl required.	Milligrams of salicylic acid taken.	One-tenth c.c. of U. S. P. HCl required.	Ratio between the salicylic acid taken and the HCl.
1	4	1:4·0	11	10	1:0·909
2	5	1:2·5	12	10	1:0·833
3	6	1:2·0	13	11	1:0·846
4	7	1:1·75	14	11	1:0·785
5	8	1:1·60	15	12	1:0·800
6	8	1:1·33	16	12	1:0·750
7	9	1:1·28	17	12	1:0·705
8	9	1:1·12	18	13	1:0·722
9	10	1:1·11	19	13	1:0·684
10	10	1:1·00	20	14	1:0·700

It will be seen that liquid volume is a very important factor.

It seems as though the homologues affected this reaction somewhat. An acid of the market, yielding both by acidimetry and CO_2 estimation figures corresponding to 60 per cent. of salicylic acid, and 40 per cent. of homologues, yielded with this Fe_2Cl_6 method results corresponding to pure salicylic acid, namely 1·4 c.c. of HCl were required to discharge the violet colour produced by Fe_2Cl_6 in 10 c.c. of a solution containing 20 milligrams of the acid. This shows that work must be done on the homologues and isomers before this method can be of any use.

III. *Determining the amount of NH_3 required to neutralize the acids.*

When dry, salicylic acid absorbs one molecule of NH_3, while its isomers and nitrosalicylic acid absorb two molecules. Experiments were made to see if the commercial acid would absorb an excess of NH_3. The results showed that it did not. In these experiments the acid was dissolved in the ammonia-water and so was not dry. But the absence of isomers was proved by the complete solubility of one gram of the acid in 53 c.c. of chloroform.

This method may be of some use but needs more detailed work.

IV. *The use of $CuSO_4$ solution.*

(1) *In alkaline mixture.*

When one molecule of salicylic acid is treated with two of NaOH, it will prevent the precipitation of one-half molecule of CuO.*

For this a solution of NaOH containing 80 mgms. to the c.c. was made up, also one of $CuSO_4$, 5 H_5O containing 124·6 mgms. to the c.c.

The operation was as follows :

Weigh out 138 mgms. of salicylic acid and dissolve in one c.c. of NaOH solution; then add from a burette the $CuSO_4$ solution. If the acid used be pure salicylic acid (or any aromatic ortho-acid), no precipitate should be observed. This operation was tried three successive times on pure acid and the same results obtained each time. Then the commercial acid was subjected to the same treatment. Permanent precipitation was observed when but 0·5 c.c. of $CuSO_4$ solution had been added. A full c.c. of $CuSO_4$ solution, however, was added, and the precipitate filtered out and estimated by KCN.

On two different trials this precipitate equalled 52·04 per cent. and 51·9 respectively of $CuSO_4$, 5 H_2O taken. It would seem remarkable that 40 per cent. of impurity should precipitate 52 per cent. of the $CuSO_4$ taken, and 60 per cent. of salicylic acid should hold only 48 per cent. of $Cu(OH)_2$ in solution. This is deserving of further investigation.

(2) *Use of HCl to destroy the green colour produced by $CuSO_4$ in solutions of salicylates.*

This depends on the fact that when an aqueous solution of a salicylate is treated with $CuSO_4$ solution an intense emerald green colour is produced which is discharged by ammonia and strong acids.*

Not much work could be done on this, but it was ascertained that 0·2 c.c. of HCl (U. S. P.) discharged the green colour in 10 c.c. of 0·02 per cent. of solution of salicylic acid and of the commercial acid, but that liquid volume did not interfere.

V. *Comparison of Methods.*

The following is a tabular arrangement of the results obtained by different methods, when applied to the same commercial sample of salicylic acid :

Acidimetry.	CO_2 estimation.	Fe_2Cl_6 method.	Absorption of NH_3.	$CuSO_4$ in alkaline solution.	HCl to decolorize green colour of $CuSO_4$ in salicylate.
One gram of acid required 699·8 c.c. of $\frac{n}{10}$ KOH, an average of 3 titrations.	One gram of acid yielded enough CO_2 for 617 mgms of salicylic acid.	10 c.c. of a solution containing 20 mgms. of salicylic acid required 1·4 +c.c. of U. S. P. HCl to discharge the violet colour caused by Fe_2Cl_6.	The same amount required as with pure acid.	Yielded a ppt. when but $\frac{1}{4}$ mol. of $CuSO_4$ had been added. When 124·5 mgms. of $CuSO_4$ had been added the ppt. equalled 54 per cent. of the $CuSO_4$ taken.	Same am't of HCl required as for a pure acid.
Indicates 35 to 40 per cent. hydroxytoluic acid.	Indicates 38 3 per cent. acid other than salicylic.	Indicates a pure acid!	Indicates a pure acid!	Indicates the presence of acids other than ortho acids.	Indicates a pure acid!

From the above it would seem that the method by acidimetry furnished a ready and quite accurate method for the estimation of homologous acids, as is confirmed by the estimation of CO_2. Also that the precipitation of $Cu(OH)_2$ from carefully standardized solutions is a quite ready and reliable method for the detection of acids *other* than ortho, since the property of preventing the precipitation of $Cu(OH)_2$ by fixed alkali hydrates seems to belong to the aromatic *ortho* acids in general and not to salicylic acid in particular.

The discharge of the colours, caused in solutions of salicylic acid by Fe_2Cl_6, and of salicylates by $CuSO_4$, by HCl, is not trustworthy without further detailed work on the isomers and the homologues and their behaviour towards these reagents both when free and mixed with salicylic acid.

The method by acidimetry might well be considered for a pharmacopœial requirement for controlling the quantities of homologous acids present in salicylic acid, and with further detailed work the use of $CuSO_4$ solution might be advantageously added.

The estimation of CO_2 is too cumbrous for ordinary purposes, but might serve as a control analysis. In this method it is well that the decomposing flask be tall, so that any acid that sublimes may be condensed rather than drawn outside of the flask into the rest of the apparatus, and thus lost for estimation and vitiating the results. The temperature most to be recommended is between 120° and 130° C.

* Berichte, ix., 342.

* Schulz, *Zeits. anal. Chemie.*, xix.

6. *Tabular View of Isomers and Homologues.*

	Crystalline forms.	Solubility in 100 pts. of water at 0° C.	Solubility in 100 pts. of water at 15° C.	Solubility in 100 pts. of water at 100° C.	Solubility in alcohol.	Solubility in ether.	Solubility in chloroform.	Melting points.	Reaction with Fe_2Cl_6.	Heated in a sealed tube with concentrated HCl.	Heated with concentrated H_3PO_4.	When treated with fixed alkali hydrate and $CuSO_4$ sol.	When heated with CaO.	Vaporizing.
Ortho-hydroxybenzoic acid.	Fine needles from water; monoclinic prisms from alcohol.	0·092 part.	0·225 part.	7·925 part.	Soluble in 2·4 pts.	100 pts. di-solve 50·47 pts.	Very soluble.	155° to 156° C., *Journ. Chem. Soc.*, xl., 11.	Violet colour.	Yields CO_2 and phenol at 140° to 150°.	Yields CO_2 phenol at 120°.	Blue-green colour preceded by a precipitate soluble in an excess of the acid.	Yields CO_2 and phenol.	With steam. Liebermann and Dehust, *Ber.*, xii., 1291.
Meta-hydroxybenzoic acid.	Needles collected in little warts.	0·377 part.	At 18° C. 0·925 part.	Very soluble.	—	—	Almost insoluble. Kolbe, 1874; *Jour. pr. Chem.* (2), x., 102.	200° C.; Rechenberg, *Journ. pr. Chemie* (2), xxii., 243; *Journ. Chem. Soc.*, xl., 11.	No colour.	Decomposes only at a high temperature.	—	Immediate precipitation.	—	Not with steam. Liebermann and Dehust, *Ber.*, xii., 1291.
Para-hydroxybenzoic acid.	Small monoclinic prisms from water; larger ones from alcohol	0·172 part.	0·793 part. Saytzeff, *Ann. Chem. Pharm.*, 127, p. 129.	Very soluble, Saytzeff, *Ann. Chem. Pharm.*, 127, p. 129.	Easily soluble, Saytzeff, *Ann. Chem. Pharm.*, 127, p. 129.	Easily soluble, Saytzeff, *Ann. Chem. Pharm.*, 127, p. 129.	Almost insoluble. Kolbe, 1874; *Journ. pr. Chem.* (2), x., 102.	210° C.; Rechenberg, *Journ. pr. Chemie* (2), xxii., 243; *Journ. Chem. Soc.*, xl., 11.	Dirty yellow precipitate.	Yields CO_2 and phenol at 135° to 140°.	—	Immediate precipitation.	—	Not with steam. Liebermann and Dehust, *Ber.*, xii., 1291.
Hydroxytoluic acid, CO_2H; $OH : CH_3$, 1 : 2 : 3.	Long flat needles from water.	—	Sparingly soluble.	—	—	—	Easily soluble in the cold.	163° to 164° C., Beilstein, 1458; 160°, Prescott, 443; 163°, Weith, *Ber.*, ix., 342; Jacobsen, *Ber.*, xvi., 1963; *Journ. Chem. Soc.*, xliv., 1124.	Intense violet.	Yields CO_2 and orthocresol at at 210°.	—	—	—	With steam.
Hydroxytoluic acid, CO_2H; $OH : CH_3$, 1 : 1 : 4.	Needles from water; monoclinic prisms from alcohol.	—	Sparingly soluble.	Quite readily soluble. O. Jacobsen, *Ber.*, xiv., 41.	Readily soluble. O. Jacobsen, *Ber.*, xiv., 41.	Readily soluble. O. Jacobsen, *Ber.*, xiv.' 41.	Sparingly soluble. O. Jacobsen, *Ber.*, xiv., 41.	177° C., Beilstein, 1459;—173°. Prescott, 443;—172°. Weith, *Ber.*, ix., 342. Jacobsen, *Ber.*, xiv., 41; 963; *Journ. Chem. Soc.*, xl., 599; xlvi., 745.	Intense violet. Beilstein, 1459; Prescott, 443. Precipitation, O. Jacobsen, *Ber.*, xiv., 41.	Yields CO_2 and metacresol at 170°.	—	—	—	With steam.
Hydroxytoluic acid, CO_2H; $OH : CH_3$, 1 : 2 : 5.	Very long needles from water.	—	Sparingly soluble.	Readily soluble.	Easily soluble.	Readily soluble.	Readily soluble.	151° C., Beilstein, 1458; Prescott, 443;—177° to 178°. Weith, *Ber.*, ix., 342; Tiemann and Schott, *Ber.*, xi., 778; xii., 1340; *Journ. Chem. Soc.*, xxxiv., 877; Schall, *Ber.*, xii., 820; *Journ. Chem. Soc.*, xxxvi., 794.	Intense blue-violet	Yields CO_2 and p. cresol at 180° to 185°.	—	—	Ortho-cresol and CO_2 are formed.	With steam.

Society of Chemical Industry.

A Short Account of the Opium Industry in the N.W. Provinces and Oudh.*

BY P. A. WEIR, M.B.

At the request of the Secretary I have compiled, for the information of the Section, the following notes, the greater part of the material of which already exists on record, for the most part, however, in the official publications of the Governments of Bengal and of India, which are not perhaps within reach of many in this country.

The opium poppy is a native of Asia Minor, but having been so long and generally cultivated in Europe and parts of Asia, it is now naturalized less or more in many different countries. The precise date of its introduction to India is unknown, but it can be traced as far back as the sixteenth century, during the latter half of which the produce of the opium monopoly in the sarkars of Allahabad and in Ghazipur was 1000 chests, according to the A'in Akhbár of Abul Fazúl. It had attained considerable importance by 1786, at which time Lord Cornwallis wrote a minute respecting the best method of deriving a revenue from opium. It has now been long extensively cultivated in the Upper Gangetic plain, in Behar, Bundelkhand, and Malwa. "The area under poppy cultivation in the N.W. Provinces and Oudh is scattered over thirty-eight of the forty-nine revenue districts in these provinces, and occupies more than ¼ million acres, and necessitates the employment of no less than 2½ millions persons in the fields." For the Chinese market the opium of the Behar and Benares agencies is commercially the best, as being the most approved by the Chinese, although *officinally* it is inferior to the Smyrna drug.

The cultivation of opium in India in British territory is a Government monopoly, existing for the benefit of the Imperial revenue. The Opium Department is for convenience administered, under the Lieutenant-Governor of Bengal, by the Board of Revenue of the Lower Provinces. Subordinate to the Board are the two opium agents, each of whom is in charge of one of the two opium agencies. One of these is the Behar agency, with its headquarters at Patna, and situated entirely in the Lower Provinces. The other is the Benares opium agency, situated in the N.W. Provinces and Oudh, and having its headquarters at Ghazipur, on the Ganges, about 40 miles from Benares. In each agency there are under the agent two sets of officials, the district officers concerned with the production of the raw material, and the factory staff occupied in its manufacture.

The system of cultivation at present in force in British territory is briefly as follows:—No poppy is allowed to be grown save with the permission of Government. Government grants this permission to suitable cultivators on condition that only a certain definitely agreed on area of land shall be sown by each with poppy, and that the entire produce shall be made over at the proper time to the agents of Government in exchange for its value in cash calculated at the rate (at present) of Rs. 5 per ser of 70° consistence. (70° consistence opium is opium of which 100 grms., when dried at 100° C., yield 70 grms. residue. Opium of this consistence is called standard opium.) Permits or licenses to grow poppy are issued in the period from August to October, at which time the district officers meet the would-be cultivators or their agents and settle more or less directly with each the area he is to be allowed to cultivate. The experience of many seasons, as recorded in the books of his office for each locality, enables a district officer to estimate very closely the average quantity of standard opium that the particular area licensed to any cultivator is likely to produce. In this way the district officer is able to keep within the limits of the quantity his district has been called on to supply, which quantity in turn is based on the indent sent down by Government to the agent, and by him apportioned among the districts under his charge. At the time of settlement the district officer makes to the cultivator a cash advance of a certain percentage of the value of the out-turn of standard opium that the area he has undertaken to cultivate is estimated to produce. For such advances, and for similar advances towards the purchase of bullocks, the sinking of wells, etc., and aggregating over 200 lakhs of rupees (nominal £2,000,000 sterling) per annum, no interest is charged by Government, the cultivator enjoying the use of the money free. The advances are in due course recovered in the shape mainly of produce, the balances being paid up in cash, and outstandings of any size are little known.

Having settled with the district officer, and been licensed to sow a certain area, the cultivator returns home and prepares his land, and makes other necessary arrangements, and in due course, about November, he commences to sow his seed. During the growth of the plant, the industrious cultivator takes care to attend to its proper tillage, watering it at the proper times, and keeping the ground free from weeds.

During this season the district officer with his staff goes on tour throughout the area under his charge—which may measure many hundred square miles—in order to measure the ground cultivated by each licensee for the purpose of seeing that he has sown up to his engagements (on which his advances were calculated), and not in excess of his engagements (as this would throw out the arrangements for complying exactly with the indent set down by Government); to see that the cultivation is being carried on in a proper manner (the plant being watered as required, and the soil kept clear of weeds), and that no other crops are being simultaneously cultivated in the poppy field; to give, if necessary, a further cash advance on account of the value of the estimated out-turn; to see that no illicit poppy cultivation is being practised, which would lead to smuggling, and to the defrauding of the Excise revenue; and to report, periodically, to the agent on the general prospects of the crop.

About the beginning of February the plants begin to flower. At this time is begun in certain districts the preparation of "leaf." "Leaf" is the technical name for the material used at the factory to form the shell of the opium cake in course of provision for the China market. About the close of the third day of the flower's expansion the petals are in such a stage of maturity that they are ready to drop off the top of the seed-vessel at a touch; at this stage the cultivators go through the fields in the afternoon, and collect the petals or carry them home. In the evening, after she has baked her husband's bannock, the cultivator's wife takes two or three handfuls of the petals and throws them on the top of the hot griddle-iron, and as the gummy juice of the petals exudes by the heat, she presses the petals down by a damp cloth which she skillfully manipulates, until what with the steam from the cloth and the gum in the leaves, the petals become agglutinated, and ultimately take the pancake-like form of the so-called "leaf." The leaves are carefully dried, and are in due course brought by the cultivator to the district officer, who receives them on behalf of Government, and pays for them according to their quality, at from Rs. 10 to 5 a per maund (of 82⅔ lbs.), and forwards them to the factory at the headquarters of the agency for disposal.

The annual consumption of "leaf" in the preparation of the shells of the provision of opium for the

* Read at a meeting of the Glasgow and Scottish Section. From the Journal of the *Society of Chemical Industry*.

China market is very large—amounting to from 16 to 20,000 maunds — representing the petals of over 5000,000,000 flowers, according to Scott's calculations.

In the course of from seven to ten days from the fall of the flower leaves, the capsules are sufficiently mature for the extraction of the drug, becoming plump and firm, and coated with a fine whitish bloom.

The incisions are now commenced, and are carried on regularly every third day, and according to the condition of the plant, and the time of the collection, the number of lancings required to extract all the juice varies from one to five or six, and perhaps seven in isolated cases. The lancing is carried on in the afternoon, and consists of three or four vertical incisions performed at one operation by three or four primitive lancets tied together with cotton thread. The juice exudes slowly, and is milky-white at first, the outer part of the tear gradually changing to a pinky salmon colour. Next morning the tears that have exuded are scraped off by an iron trowel-shaped scraper and put into a metal dish, from which at the cultivator's house they are transferred to unglazed earthen vessels set atilt to allow excess of watery matter and pasewa to drain off. The aggregate of the drug belonging to a cultivator is kept in a shady place in his house, and carefully treated so as not to injure the grain, but to allow the consistence to rise evenly until it has reached the desired degree. The opium is then brought to the district officer at the appointed time and place, and he receives it over by weight on behalf of Government, and transmits it to the factory in jars containing one maund (82$\frac{2}{7}$ lbs.) each, paying to the cultivator a further advance on its value according to his estimate of its assay. The annual amount of opium delivered in the two agencies amounts to perhaps 107,000 maunds at 70° (equal to about 3900 tons, and for which the cultivator would receive Rs. 2,14,00,000, nominally 2$\frac{1}{7}$ million pounds sterling).

After the collection of the opium has ceased the plants are allowed to remain standing in the fields till the capsules are quite ripe; these are then collected, and the plant leaves when dry are, in certain districts, gathered and sent into the factory under the name of *trash*, to be used as dunnage in packing the provision opium for China. Trash is paid for in the Benares agency at about 10 annas per maund. The annual outturn of trash in the two agencies is more than 28,000 maunds.

The opium on arrival at the factory is, after weighment, examined jar by jar by the opium examiner, who certifies to its quality and purity. It then has its consistence determined for each jar by assay on the steam table, and according to its consistence it is stored away in one or other of the extensive ranging store vats in the malkhana or storehouse, some of which hold 3000 maunds. The final payments to the cultivators are made according to the value of the opium as determined by its consistence on assay at the factory.

When a sufficient quantity of suitable opium has been received into the factory, the manufacture of the provision of opium for the China market is commenced. The provision is caked at the consistence of 70°, to this end quantities of opium of consistences above and below 70° are alligated or mixed together in certain proportions so that the mean consistence of the mixture may fall within the limits allowed. Before issue from the caking vats the opium in them is assayed for consistence to ensure that it does not fall below the caking standard laid down by Government.

For *each* "cake" there are served out the equivalent of a certain weight of standard opium for the central mass, together with a certain measure of "*lewa*," the equivalent of a fixed weight of standard opium. Lewa is a paste made of opium broken up in water, and is of 52·5° consistence. For each cake is also issued a certain weight of leaf, which is previously damped to make it flexible and non-friable.

In a hemispherical brass cup of about six inches in diameter, the cakemaker pastes layer after layer of pieces of leaf which he gums together with lewa until the thickness of the hemisphere of shell in the cup in $\frac{1}{2}$ inch, and over the edges of the mould he allows the free ends of the pieces of leaf in the cup to hang. The opium is then deposited in the centre of the hemisphere of shell in the cup, and over it the overhanging leaves are brought and carefully imbricated and pasted down with lewa, and bound together by fresh portions of leaf, and finally over all one of the finest leaves is pasted on and a complete sphere results. This is turned out of the cup and covered halfway up with "trash," which prevents it sticking to the inside of the porous earthenware cup into which the cake is now put. The cup and cake are put on a shelf in a well-ventilated warehouse. Caking goes on from May till July at the rate of about 20,000 cakes per diem. The cakes remain on the racks till they are fit for packing, and each cake is periodically turned about in the cup so that it shall dry regularly and evenly, and preserve its spherical shape.

Packing begins about the middle of November. Previous to the commencement of the season's packing the chief civil officer or magistrate of the district visits the factory and selects at random out of the whole stock of provision in the factory six cakes for analysis; two are retained at the factory, two sent to the sister factory, and two go to the chemical examiner to Government at Calcutta. The results of the analysis of each of these three sets of two cakes (in terms of their morphia, narcotine, and smokeable extract) are put on the table at the first sale of the season's opium, for the information of the merchants.

Packing is carried on in fine weather only, and is not practicable in damp, cloudy or rainy weather. 20,000 cakes are packed daily in 500 chests, 40 cakes in a chest, the dunnage used being the "trash" already described. 500 chests a day are daily dispatched from the factory en route for Calcutta, where they are stored in large warehouses under the charge of the Board of Revenue, by whom a certain number are exposed for sale each month on account of the Imperial Government.

The opium intended for Indian consumption is not made up into balls of 70° consistence; it is exposed in the sun in shallow trays until it has become inspissated to a consistence of 90°, at which point it is melted into cubical cakes of 1 ser, each of which is smeared with poppy oil and packed in two layers of bamboo paper. The cakes are then packed in sixties in mango-wood chests, which are distributed as required to the different treasuries of the N. W. Provinces and Oudh and Central Provinces.

Opium, which on examination at either factory is found to be adulterated or otherwise unfit for manufacture, is confiscated, and the morphia and codeia in it are recovered in the laboratory department of the Ghazipur factory. Narcotine used also to be recovered; the demand for it has, however, now almost entirely increased, and it is no longer prepared at Ghazipur.

"The cultivation of the poppy is popular amongst our cultivators . . . . . the certainty of receiving a fixed price for their opium, the payment of advances without interest at periods at which the Asámis are generally hard pressed for funds; the obtaining high prices both for the poppy petals and leaves; the getting of advances free of interest for wells and frequently for the purchase of bullocks; and the remission of all the advances outstanding if their crop has been destroyed by hail; these advantages and large profits derived from opium attach the Asámis

to the cultivation and make it popular. Hindoos of all castes, from Brahmins down to Chamars, and Mahomedans, too, cultivate poppy, but the Koeri caste are our best cultivators."—(Turnbull.)

In one year, for an actual cultivation area of 899,287 bighas (562,054 imp. acres), cultivated by 1,448,508 Asámis, the out-turn of opium at 70° consistence was 107,577 maunds (3952 tons), for which were paid to the cultivators in hard cash Rs. 2,15,15,400 (2⅐ million pounds sterling nominal), besides which 19,872 maunds of leaf and 28,773 maunds of trash were supplied and paid for.

In the same year there were turned out (from confiscated useless opium)—

	Lb.
Codeia	34
Morphia acetate	34
„ hydrate	282
„ sulphate	17

Parliamentary and Law Proceedings.

A Fatal Mistake: Warning to Grocers.

At Manchester the Deputy City Coroner (Mr. S. Smelt) held an inquest on Monday on the body of Ernest Lee, aged three months. On Monday afternoon last Kate Lambert, aunt of the deceased, went to the shop of Messrs. D. Melia and Co., grocers, Deansgate, for two ounces of arrowroot with which to feed the child. The assistant at first gave her caraway seeds, but on the mistake being pointed out he weighed a portion of what was supposed to be arrowroot and gave it to Lambert. Although the article did not mix properly with the milk and water, the child was fed with a bottleful of the mixture. The next day it was taken ill, and on Friday Dr. Mann was called in. The child died on Saturday afternoon. The tin from which the supposed arrowroot had been supplied was labelled in large letters, "Genuine St. Vincent Arrowroot," followed with directions for use. Across the label, however, the words "Cream of Tartar, 1*s.* 8*d.* per pound," were written in ink.

Dr. Mann described the symptoms of the deceased, which were, he said, those of acute diarrhæa. He was shown a portion of the stuff which had been given to the child, and upon examining it found it to be cream of tartar. The effect of administering half a teaspoonful of cream of tartar to a child of the deceased's age would be to cause diarrhœa. In his opinion the cream of tartar had been the primary cause of death in this case.

Henry Cavanagh, the assistant who supplied Lambert, said that he had never before sold cream of tartar. The manager, George Worsley, had told him that morning that he had filled the tin with cream of tartar, and had altered the label accordingly. Witness did not notice the writing on the label when he served Lambert.

Worsley, having been duly cautioned by the coroner stated that cream of tartar was put into arrowroot tins to preserve it. Until this affair he was not aware that cream of tartar was a poison, and he did not know what effect it had when taken, though he had sold it many a time. He admitted that he had altered the label, but said that he called the attention of the other assistants—Cavanagh included—to the change at the time.

The coroner, in summing up, called the attention of the jury to the importance of the point as to whether the label had been altered sufficiently to prevent the possibility of mistake, and said if the jury thought there had been any gross or criminal negligence on the part of Worsley they must send him to take his trial for manslaughter.

The jury found that the child died from diarrhœa, the result of the administration of cream of tartar in mistake, for arrowroot. They considered that Mr. Melia should be censured for employing a manager so young as Worsley (he being only 20 years of age), and that Worsley should be censured for his negligence.

The Coroner said that on the evidence the jury would have been quite justified in committing Worsley for trial for manslaughter.—*Manchester Guardian.*

Obituary.

Notice has been received of the death of the following:—

On the 17th of August, Mr. James Neville, Chemist and Druggist, Wallgate, Wigan. Aged 64 years.

On the 19th of August, Mr. John Godwin Protheroe, Chemist and Druggist, Chard Street, Axminster. Aged 31 years.

On the 21st of August, Mr. Thomas John Williams, Chemist and Druggist, Ordsal Lane, Salford. Aged 49 years.

On the 22nd of August, Mr. John Samuel Hodgkinson, Chemist and Druggist, Matlock Bridge, Derbyshire. Aged 53 years. Mr. Hodgkinson had been a Member of the Pharmaceutical Society since 1873.

On the 22nd of August, Mr. Alexander Maitland, Chemist and Druggist, Pitmachie-by-Insch, Aberdeenshire. Aged 66 years.

On the 25th of August, at Ockham Bryan, near York, Mr. William Simpson. Aged 37 years. Mr. Simpson had been connected with the Pharmaceutical Society several years as a Registered Apprentice.

ANSWERS TO CORRESPONDENTS.

A. E. Bones.—The communication is unsuitable for insertion.

Inquirer.—A reference to the subject of the Act will be found on another page.

H. Dimmin.—The return is published as a parliamentary paper and may be obtained from Messrs. Eyre and Spottiswoode, East Harding Street, E.C.

Aspirant.—All applications for membership should be addressed to the Honorary Secretaries of the Conference, 17, Bloomsbury Square.

Exhibition.—The exhibits of the other French colonies will be dealt with in future numbers.

J. Howe.—The Botany required in the Major examination comprises an intimate acquaintance with the parts of the flower, fruit and seed; the functions and mode of arrangement of the different organs of plants; a knowledge of the general principles of classification and of the Linnean and De Candoleés systems, and the ability to distinguish practically between about twenty of the principal orders, and to refer to their respective orders specimens shown to him. For further details see the Regulations of the Board of Examiners, a copy of which may be obtained from the Secretary.

Messrs. W. B. Orton and *W. Wilkinson* are thanked for their communications.

Formulary.—The National Formulary is a collection of formulæ issued under the auspices of the American Pharmaceutical Association. The "elixir adjuvans" of that work is a preparation chiefly intended as a vehicle, particularly for the acrid and saline remedies. The formula will be found in the *Pharmaceutical Journal* for July 28, 1888, p. 69.

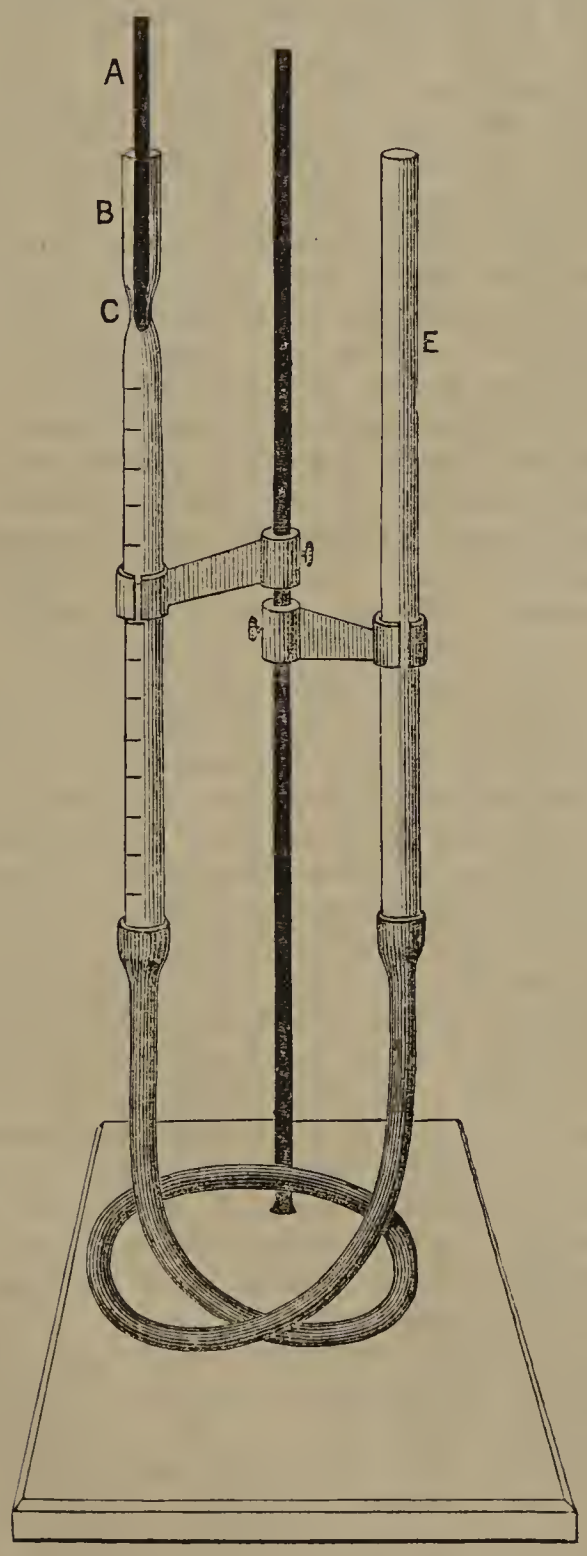
Communications, Letters, etc., have been received from Messrs. Prescott, Frazer, Naylor, Attfield, Umney, Plowman, Garnett, Raven, Battonian.

A SIMPLE APPARATUS FOR TESTING SPIRITUS ÆTHERIS NITROSI.

BY A. E. SLINN AND H. STUBBINS.

The well-known gasometric methods of estimating spiritus ætheris nitrosi are not generally resorted to by provincial pharmacists, owing to the fact, no doubt, that nitrometers as a rule find no place in their stock of apparatus. And the process lately devised by Professor Dunstan and Mr. T. S. Dymond, though admirably simple and accurate, is hardly more practical, since the average chemist does not possess a burette.

Now with a little manipulative skill, an efficient apparatus may easily be constructed as follows :— Take two straight pieces of glass tubing, having ½ inch bore and say twenty inches long. About three inches from the end, one of the tubes should be drawn out (by holding in a Bunsen flame) to the thickness of a ¼ inch. This we will call the



neck (C). Next draw out to a point, a piece of narrow glass tubing, and make the point air-tight by fusing in a flame ; while the point is moderately hot, insert it in a small piece of ordinary black (feeder) tubing (if done carefully it will adhere firmly). When cold, wet it, and insert it in the neck, so as to form a perfectly airtight plug (A). Gently scratch a mark on the neck with a sharp three-cornered file, to indicate the proper position of the plug when working it. The tube has now to be graduated: drachms will be found most suitable for this size tubing. Hold the tube upside down and pour into it a carefully measured drachm of water, and while taking care to hold the tube perpendicularly, scratch a mark with the file ; introduce another drachm, mark as before, and so proceed to the end. The cup (B) can also be graduated, though using a measure direct saves time and trouble. The tube is now complete, and has only to be attached to the other tube, by a piece of india-rubber tubing (say about three feet long), and fixed to a heavy retort stand, by means of two clamps.

To use the apparatus raise the limb (E) about 6 inches, then pour in and fill up to the neck with strong brine, carefully insert the plug *so as to exclude any air*, then depress the limb (E) about 12 inches. Pour into the cup a carefully measured drachm of the sample to be tested ; gently raise the plug with a spiral movement, and when all but two or three drops have run in, close the aperture, add a few drops of water and gently run in all but one or two drops. Next gently introduce a drachm of strong solution of potassium iodide (say 10 or 12 per cent.) and then let in *slowly* a drachm of dilute sulphuric acid. Carefully place the plug in its proper position, agitate briskly at intervals, and after five minutes or so adjust the liquid in the two limbs to the same level, and note the volume of gas produced. This is well-known as Allen's process ; and the above apparatus was devised with the idea that the chemist who would not go to the expense of a nitrometer, would, by its very simplicity, be tempted to test his sp. æther. nit., if he had any reason for doubting its strength. Of course, strict accuracy cannot be claimed for it, but it is sufficiently accurate for testing according to the B.P. The materials for constructing it could, we venture to say, be found in every chemist's shop, while the cost would not exceed a shilling. It is extremely simple of construction, is not complicated in any way, and when made, the process of testing a sample of sp. æther. nit. is both interesting and easy ; in fact, it could be successfully performed and understood by any senior apprentice of average intelligence.

LESSONS FROM FIELDS AND LANES.

SEPTEMBER.

"Season of mists and mellow fruitfulness,
Close bosom-friend of the maturing sun ;
Conspiring with him how to load and bless
With fruit the vines that round the thatch-eaves run ;
To bend with apples the moss'd cottage trees,
And fill all fruit with ripeness to the core ;
To swell the gourd, and plump the hazel shells
With a sweet kernel ; to set budding more,
And still more, later flowers for the bees,
Until they think warm days will never cease ;
For summer has o'erbrimm'd their clammy cells."

"Mellow fruitfulness !" Here we have described in two words the botanical character of the month. Wheat, oats and barley, apples, plums and pears, hips and haws, acorn and hazel-nut, rasps and brambles, all combine to tickle the palate of the youthful philosopher, to arouse the enthusiasm of the botanical student, or it may be to fill with dismay the heart of the "Minor" aspirant.

If the scales be separated from the "kernel" of the wheat the latter will be found to consist of a single seed firmly attached to an outer skin (the *pericarp*). The fruit of the *Compositæ* approaches very near to the *Gramineæ* in structure; both are one-seeded, dry and *indehiscent* (not splitting open when ripe). The fruit of composites is, however, known as an *achene*, while that of grasses is known as a *caryopsis* or *grain*; the difference is that in the achene the pericarp is easily detached from the seed while in the caryopsis it is not. A *nut* is simply an achene in which the pericarp has become thick and leathery or woody; the nut is often surrounded at its base with an involucre, and is then known as a *glans*, as seen in the hazel-nut and acorn. In the acorn the involucre forms a distinct cup or *cupule*. The *winged nut* of the elm is familiar to all frequenters of the country. The *samara* or winged fruit of the sycamore and maple differs from this in having two seeds, each provided with a wing and supported on a little stalk, just as we found in the cremocarp or umbelliferous fruit; the samara might in fact be described as a cremocarp in which the mericarps were winged.

The plum, apple, hip and haw, are examples of *succulent* fruits; they all belong to the same order (*Rosaceæ*), and are yet very different in structure. The plum—with its relatives the damson, sloe and cherry—is an example of the *drupe*, which cannot be better defined than as a *fleshy* achene. Three distinct layers may be noticed in the pericarp, the *epicarp* or skin, the *mesocarp* or pulpy portion, and the *endocarp* or stone, the latter enclosing the seed. The apple and pear form examples of the *pome*; the edible portion here is formed by the calyx tube, which has become succulent. The "hip" is known as a *cynarrhodum*, and consists of a number of achenes enclosed in a fleshy calyx tube. The bramble or blackberry and the raspberry consist of a number of drupes united into a head; such a combination is known as an *etærio* of drupes. The fruit of the buttercup is an etærio of achenes. The strawberry is also an etærio of achenes, but the receptacle, instead of being dry, as in the buttercup, has become enlarged and succulent, forming the edible portion. An interesting fruit now to be found almost everywhere is that of the willow-herbs (*Epilobium*). *E. montanum* is perhaps the most common species in dry places, while river banks and moist places should furnish an abundance of *E. hirsutum* and *E. palustre*; *E. angustifolium* is sometimes found wild, but is more common in gardens. The willow-herbs belong to the order *Onagraceæ*, the same order as the fuchsias, and when in flower—from June to August—may readily be recognised by their *long inferior* ovary, eight stamens, and four petals. The rich, soft, rose-coloured flowers of the three last mentioned if once recognised are not soon forgotten. *E. montanum* is paler and more delicate looking. The long ovary when developed forms a *capsule*, a general name given to fruits composed of several carpels, which dehisce or split open when ripe. Capsules have, however, different methods of effecting this dehiscence; in the present case it takes place by *valves*, the carpels splitting away and leaving the hairy seeds attached to a central axis. In henbane the capsule dehisces by means of a lid at its apex, while the poppy effects the same purpose by pores beneath the stigma.

The order *Labiatæ* has still some representatives among the flowers of field and lane, and to the pharmaceutical student perhaps the most interesting of these are the mints. The genus *Mentha* may be divided into two divisions, in one of which the calyx throat is hairy, while in the other it is glabrous or smooth. In the first division the only species is *Mentha Pulegium*, the *Pennyroyal*; damp heaths are its favourite habitat, but it is not by any means common, and in Scotland is scarcely known; it has a much branched leafy stem with recurved leaves, and the lilac flowers are in whorls arranged at different levels on the stem. The smooth-throated calyx bearers are again subdivided according to the arrangement of the flowers on the stem; in *M. aquatica*, the most common species, the flowers are in spikes at the apex of the stem; in *M. piperita*, the peppermint, the same arrangement holds; indeed this is sometimes considered simply as a variety of *M. aquatica*; *M. viridis*, spearmint, has the same characteristic, but is seldom found wild. In peppermint the leaves are stalked, while in spearmint they are sessile, the most ready means of distinguishing the plants, especially when dried. In *M. sativa*, a kind of marsh mint, and in *M. arvensis*, the corn mint, the flowers are arranged in whorls at different levels on the stem, just as in the pennyroyal. Growing alongside the corn mint there will probably be found two species of hemp-nettle, *Galeopsis Tetrahit*, with small purplish flowers and long stalked ovate-acuminate and serrate leaves, and *G. versicolor* with larger yellowish flowers, but in other particulars similar to the first mentioned. The hemp-nettles much resemble in structure and habit the common white dead nettle, in flower three months since, differing only in the lobing of the corolla lip and the shape of the nutlets.

The order *Scrophulariaceæ*, which we have already found to be so closely allied to *Labiatæ*, is also represented in the September flora. The figworts, *Scrophularia nodosa* and *S. aquatica*, may be easily recognized by their small dingy-purple coal-box-shaped flowers. The latter grows in wet places, and has a thick underground stem or *rhizome*, while the former takes its specific name from the knotty character of its root. The ovate, pointed fruit is a good example of the capsule, and its two cells serve to distinguish it from the four-celled fruits of the labiate order. *Linaria vulgaris*, the common toadflax, is a well-known Scrophulariaceous plant which still makes a brave show on railway embankments and waste ground: its leaves are linear and crowded on the stem; the inflorescence is a good example of the raceme, and its light yellow corolla is spurned and *personate*. A personate corolla is a corolla with two *closed* lips, and should be carefully distinguished from the *gaping* form of labiate corolla common to the dead-nettle and hemp-nettle, which is known as *ringent*, from a Latin word meaning grinning. The pretty little bluish-purple flowers of the ivy-leaved toadflax may still be found nestling in the crannies of old walls. It is often grown in cottage windows, and its graceful festoons of kidney-shaped leaves and bright, fragile-looking flowers form a by no means despicable ornament.

A walk by a corn-field now is almost sure to reward us with a glimpse of the little scarlet flowers and dotted leaves of the pimpernel (*Anagallis ar-*

vensis). Whether we see the interior of the flower is entirely dependent on the day, for it is only in the very brightest of weather that the "poor man's weather-glass" overcomes its shyness to such an extent as to open to the light of day its stamens and pistil; its small glassy capsules, looking almost as dainty as the flowers which gave them birth, dehisce transversely by means of a lid, as in the case of henbane. A capsule which opens in this manner is known as a *pyxis* or box. The plant belongs to the primrose order, and the *free central placentation* so characteristic of this order is in the capsule before us well marked. It should be noted here that where the placenta or ovule-bearing surface is free central (standing by itself in the middle of the ovary), it is impossible for the ovary to be anything but one-celled.

Our ubiquitous friends, the composites, show no signs yet of abating vigour. The pasture land is dotted with the yellow flowers of the hawkbits and the brown and purple of the knapweed; "prolific" walls still furnish a specimen or two of the wall-lettuce, with its slender heads and queer top-heavy looking inflorescence; dry banks are brightened with the yellow sprays of the golden-rod; railway embankments have their dreariness relieved by an abundance of the common hawkweed; the ragwort asserts itself everywhere, and is accompanied by the fragrant yarrow, whose white flowers give it a social position ahead of all its yellow brethren. High as we have seen the composites stand in the scale of development, many of them yet retain their primitive colour; while some, like the daisy, the marguerite and the chamomile, show a tendency to soar a little higher, and start by holding out greater attractions to their insect helps in the shape of large white ray florets.

The scabious and the teasel, members of an order —*Dipsaceæ*—much resembling the Compositæ, are now among the most pronounced features of the field and lane flora. Tho flowers, like those of the composites, are in heads surrounded by an involucre; the purple corollas are mostly tubular, although the outer florets of the heads show the same tendency as the ray florets of their composite relatives to flatten out and look more showy; the stamens are four in number and are *free*, an important distinction from Compositæ, in which the stamens are syngenesious or joined by their anthers. The teasel (*Dipsacus sylvestris*) is best known by its spiny involucre, which in some districts leads to its use by the country people as a wool-combing machine, and even as a clothes brush. The common field scabious may be recognised at once by its robust habit, the stems sometimes attaining a height of five feet, and bearing numerous heads of blue flowers which are surrounded by an involucre free from the stand-offish prickliness of the teasel; the leaves vary from pinnatifid to lanceolate; the calyx has become reduced to a number of bristles and much resembles the pappose calyx of Compositæ. *S. succisa* has flowers similar to the field scabious, but much smaller; the leaves are obovate and mostly radical; the root-stock appears to have been bitten off and is known as *præmorse*. It is from this character that the plant takes its popular name of "devil's bit." *S. Columbaria*, the only other species of scabious, often accompanies the devil's bit in dry pastures, and may be distinguished from it by its much divided, although very variable leaves, and involucre extending beyond the heads.

The *Umbelliferæ* are now making their last stand. Hedgerows in many districts owe their continued picturesqueness to one of the hedge parsleys—*Caucalis Anthriscus*—whose pinky-white flowers and prickly fruits have the appearance of a livelihood hard earned. Dry fields are still dotted with the creamy flowers and clusters of pink-topped flattened fruits of the burnet saxifrage—*Pimpinella Saxifraga*: the umbels have neither partial nor general involucre, but the plant is most easily recognised by its pinnate radical leaves with serrate leaflets; the stem leaves have linear segments, and in many the *sheath* is developed at the expense of the blade. Moist woods show a profusion of angelica (*Angelica sylvestris*), a plant in habit much resembling the cow-parsnip; the leaves, however, are much more divided (*bi-pinnate*), and the leaflets serrate. The plant before us measures 6½ feet in height, and the radical leaves are about 2½ feet across; the flowers are pinky and white, the umbels possessed of a partial involucre of very narrow bracts, and the mericarps distinctly winged.

USEFUL PLANTS OF THE GENUS PSORALEA.*

BY JOHN M. MAISCH.

One of the most interesting groups of plants are those belonging to the order of Leguminosæ which—as remarked by Lindley—"is not only among the most extensive that are known, but also one of the most important to man, whether we consider the beauty of the numerous species, which are among the gayest-coloured and most graceful plants of every region; or their applicability to a thousand useful purposes." Many of the plants are medicinal, or yield medicinal products, quite a number of which have been admitted into the various pharmacopœias, including some which are decidedly toxic, like physostigma.

Among the leguminous plants indigenous to the United States a species of *Psoralea*, common in the Southern States and west of the Alleghanies, has attracted some attention as a medicine, and though it does not seem to possess properties superior to other more generally-known drugs, it will perhaps be of interest to collect together the most important facts, recently ascertained or heretofore known, regarding the medicinal or economic value of the different species of this genus.

The name of the genus is derived from the Greek *psoraleos*, which means "affected with the itch or with leprosy," and has reference to the usually blackish glandular points found on the calyx and often on other herbaceous portions of most of the species. The plants are botanically closely related to the genus *Amorpha*, of which the indigenous *A. fruticosa* has a bark rich in tannin and containing a brown-red colouring matter, dyeing yellow with alum. The genera *Glycyrrhiza*, *Astragalus*, *Indigofera*, *Robinia*, *Wistaria* and others belong to the same tribe. The genus *Psoralea* comprises herbs, also shrubs, having leaves mostly divided into three or five leaflets, and a spiked or racemed inflorescence, the flowers being mostly purplish or blueish; the fruit is a one-seeded, indehiscent, frequently rough or wrinkled legume, which is about the length of the persistent calyx. About one hundred species of *Psoralea* have been described, of which more than forty, or nearly one-half, belong to Southern

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Africa, five or six to South America, and about thirty to North America; the greater portion of the latter are confined to the Southern States and west of the Alleghanies, and eight are found in California.

Only a small number of the species have been used, some medicinally, others as food. The food plants, as far as known, have their homes in the western section of North America. Two were mentioned some years ago by Dr. Edward Palmer in a paper entitled "Plants Used by the Indians" (see *Amer. Journ. Pharm.*, 1878, p. 545), namely:—

Ps. castorea, Watson, growing from Arizona to Nevada; the large white farinaceous roots are eaten by the Pah-Utes, raw as well as cooked, or made into bread or mush. The same tribe uses also the roots of

Ps. mephitica, Watson, which are small, but farinaceous. The plant is abundant in low places in Southern Utah; its specific name refers to the unpleasant odour of the leaves.

Ps. esculenta, Pursh., has been more widely known than the preceding two species. In the beginning of the present century it was brought to Europe by Lamare-Picquot, who recommended it as a substitute for the potato. It was cultivated for some time in France, where it became known as *picquotiane*; but the results were not encouraging, and at present it is rarely met with in Europe.

I am indebted to Mr. Clifford Richardson, of Washington, D. C., for the following graphic description of the plant, its tuberous root and the uses of the latter, written by Dr. V. Havard, Surgeon U. S. Army at Fort A. Lincoln, Dakota.

"The plant is the *pomme de prairie* or *pomme blanche* of the early Canadian voyageurs; the *prairie turnip* or *prairie potato* of the American settlers; the *tipsinah* of the Sioux, and the *taahgu* of the Osage Indians.

"Description: Perennial; roughish hairy all over; stem stout, erect, somewhat branched, from 5 to 15 inches high, growing from a tuberous root; leaves on long petioles, palmately 5-foliolate, the obtuse leaflets obovate, oblanceolate or oblong, about 1¼ inches long; stipules free, lanceolate; flowers appearing in June and July in dense thick spikes about 2 inches long, borne on peduncles 2 to 3 inches long, exceeding the petioles; each three-flowered cluster subtended by a large bract; lobes of calyx lanceolate; acuminate, 4 to 6 inches long, equal to, or larger than, the gibbous tube, and but little shorter than the purplish corolla; seed oval, three lines long, flat, smooth and shining.

"Soon after blossoming the plant dries up into a brown rigid mass, then breaks off and becomes a 'tumble weed' blown over the prairie, scattering its seeds as it goes.

"The tuber is 2 or 3 inches under ground. It is irregularly elliptical in shape, from ovoid to fusiform; in size ranging from a hen's heg to a large filbert, averaging 1½ to 2 inches in length and 1 inch in diamater. The upper end shows the scars of previous years' stems; the lower end is produced into a long and very tough tap root. It is covered with a thick leathery skin, easily peeled off its white and smooth surface. Passing through the axial line are clusters of fibers, which proceed from the stem and run into the tap root. These tough, fibrous clusters are the only inedible part of the skinned tubers. On section it is seen to be composed of a white granular mass, at first somewhat spongy, but becoming hard on drying, in which state it is friable and easily pulverized into a light starchy flour.

"The prairie turnip is a widely distributed plant. It is found from the lakes westward to the Rocky Mountains, and from the Saskatchawan river downward to Louisiana and Texas. It is on the dry table-lands of the Missouri, however, from Montana, through Dakota and Nebraska, to Kansas, that it is most abundant.

"The tuber of this plant has always been of great importance to the Indians, one of their vegetable staple foods. It is mentioned by all the explorers and voyageurs who first traded with the Indians of the Western prairies. It is in its best condition when the flowers begin to fade, in the latter part of July. At that time the squaws start out to gather their crop of tipsinah. Formerly they used a strong pointed stick to pry the tuber out; now they use a small iron bar, one end of which is beaten into a narrow blade. The tuber, cut into slices and dried, can be kept for several years without deterioration. In this state it is found in the tents of the Sioux Indians, and formerly constituted an important ingredient of their winter food. Eaten raw it has a very palatable farinaceous flavour. The Indian children, when cutting teeth, are given pieces of it to chew, with apparent benefit; they are treated in the same manner, and likewise with good result, when suffering from bowel complaints. I am told by an old settler that on several occasions, when making long marches without water, he successfully appeased the sharp pangs of thirst by keeping pieces of it in his mouth, their effect, doubtless, being to stimulate the salivary glands. The Indians generally eat this root cooked, and as they appreciate the advantages of a mixed *pot-au-feu*, boil it with tripe, fattened pup, or other choice nitrogenous food.

"Although the prairie turnip is mostly found on high prairies, it does not follow that it prefers a sandy, barren soil; on the contrary, I have observed that it thrives best in deep and fertile soil, if, at the same time, dry and porous; under such conditions the root attains its maximum development. I have hardly any doubt that under patient cultivation for a few seasons it could be improved, perhaps to an extent that would make such cultivation profitable; and supply our market with another toothsome, wholesome and nutritious vegetable."

Dr. Havard had sent some of the root to Mr. Clifford Richardson for analysis, which was completed last year, but has never been published, and was kindly furnished by him for publication with this paper. Mr. Richardson's results are as follows:—

Water	9·49
Ash	1·74
Oil (with petroleum ether)	·37
Resinous substances (with ether)	·35
Sugar (with 80 per cent. alcohol)	4·77
Sweet substance (soluble in water)	1·14
Starch (by difference)	69·60
Globulin	1·04
Albumin soluble in water	1·02
Albumin insoluble in water	6·10
Non-albuminoid nitrogenous matter	·90
Fibre	3·48
	100·00

Mr. Richardson remarks that the roots are distinguished by their large amount of starch, the presence of a new sugar readily crystallizing, and by the varied forms of nitrogenous matter; he will further investigate the sugar isolated by him.

An analysis of the root, communicated by Payen to *Comptes Rendus* in 1848, gave water 12·50, mineral matter 1·61, nitrogenous matter 4·09, and starch 81·80. The last-named item evidently includes other carbohydrates and compounds separated by Mr. Richardson.

The three American species named above are the only ones used as food, as far as I was able to ascertain. Of the species medicinally employed,

Psoralea glandulosa, Linné, attained some notoriety and created some confusion during the first half of the present century through an error into which the distinguished French naturalist, Alcide Dessalines d'Orbigny, was led, more than sixty years ago, while

travelling in South America, by referring to this plant the Paraguay tea, or *yerva maté*, which is extensively employed in South America. The parent plant of this tea had been previously named *Cassine Gongonha* by the German scientist, Karl Friedrich von Martius, and *Ilex paraguariensis* by the French botanist, Auguste de Saint-Hilaire. The name given by the last-named authority is generally recognized; but d'Orbingy's error figured in scientific literature to some extent for about thirty years, and as late as 1850, Lenoble, when publishing an analysis of Paraguay tea, followed the erroneous nomenclature (see *Amer. Journ. Pharm.*, xxiii., 182). To the same mistake must also be attributed the origin of the statement current in some recent works, that the leaves of this species are used in Chili as a *substitute* for Paraguay tea. The leaves were exhibited at the Centennial Exposition in Philadelphia (see 'Proc. Amer. Pharm. Assoc.,' 1876, p. 765), under the vernacular name of *culen*. The odour can hardly be called agreeable; it resembles that of rue, and the leaves are in their native country employed as a tonic and anthelmintic, and externally as a vulnerary. The root possesses emetic properties. Both the leaves and root have been admitted into the Mexican Pharmacopœia under the name of *yolochiahitl* (*Amer. Journ. Pharm.*, 1886, p. 171). An analysis of either part does not appear to have been made.

Psoralea bituminosa, Linné, is a suffruticose plant of Southern Europe, the leaves being trifoliolate, like those of the preceding species; the specific name refers to the peculiar odour of the plant. The leaves have long been popularly employed as a tonic, stimulant and emmenagogue.

Ps. physodes, Douglas, likewise a species with three leaflets, is enumerated by Dr. W. P. Gibbons, in a "List of the Medicinal Plants of California" (see 'Proc. Amer. Pharm. Assoc.,' 1871, p. 300), but its reputed properties or uses are not given. Neither is the plant mentioned by Carter.*

Ps. melilotoides, Michaux, s. *Ps. Melilotus*, Persoon, grows from Virginia southward, and westward to Illinois. It is very common in middle and upper Carolina and in Georgia. Two students of the Philadelphia College of Pharmacy, Aug. Bradley and Edward D. MacNair, both from North Carolina, call attention to this plant in their graduating essays, which are mainly of a descriptive nature. As indicated by the specific names the plant resembles the melilot or sweet clover in appearance. It is somewhat pubescent and more or less granular; the stem grows to the height of 2 feet, is much branched, and bears trifoliolate leaves, the leaflets varying in shape between lanceolate and narrowly oblong; not unfrequently they are glandless, which is the main distinctive character of the form *Psoralea eglandulosa*, Elliott. The numerous small purplish flowers are in axillary and terminal long-peduncled oblong spikes, and produce oval or sub-orbicular, transversely wrinkled pods. The perennial root is fusiform, sending out stout branches of similar shape, ½ to 1 inch thick, from 8 to 12 inches and more in length, externally light brown, internally white, and tough and fibrous in the bark as well as in the meditullium. The plant is collected when in full bloom. The herbaceous portion being of a weaker odour and taste is used to some extent; but the root is the principal part employed. In the fresh state it has an agreeable aromatic odour and a bitterish, spicy, or even rather acrid taste; but odour and taste are much weaker after drying.

Mr. MacNair obtained from the fresh root about 2 per cent. of volatile oil, having the sp. gr. 0·93, a pungent and bitterish taste and a neutral reaction. Tannin appears to be absent; but a dark-green colour is produced in the infusion and tincture by ferric chloride. Starch is present; also a bitter principle which has not been isolated.

Dr. Carter (*loc. cit.*) states that the drug is aromatic, bitter tonic, nervine, and is used in chronic strumous diarrhœa. The same properties were attributed to it by Dr. Mettauer, in 1867. It is said to have been much and very advantageously employed by the negroes in an affection of the digestive organs, known to them by the name of *poison*, and is usually given in the form of infusion made with the addition of a little chamomile and Canadian hemp (apocynum). Mr. MacNair has made a number of galenical preparations, among them

Tincture Psoraleæ composita, following the pharmacopœial formula for compound tincture of gentian, substituting psoralea root for the gentian.

Extractum Psoraleæ was prepared with diluted alcohol and *Extr. Psoraleæ fluidum* with diluted alcohol, the finished preparation containing 5 per cent. of glycerine.

Mr. Bradley states that the drug is administered in the form of a 20 per cent. *tincture*, made with a diluted alcohol, and given in doses of one to four drachms.

Some of the popular names of the drug are Samson's snake root, congo root, pigtail root, and Bob's root.

Psoralea pentaphylla, Linné, is a Mexican species having five leaflets. During the past century the root was sent to Spain; it is mentioned in the universal pharmacopœias of Jourdan (1828), and Geiger (1835), as *radix contrayervæ novæ*, *p. albæ* (*s. majoris*, *s. mexicanæ*); it had been recommended as a substitute for the South American contrayerva (*Dorstenia*), but like the latter had become obsolete. Though of Mexican origin, it appears to be at present little known in that country and is not mentioned in the Mexican Pharmacopœias of 1874 and 1884. The root was described as being of the thickness of a finger to about two inches, with a rugose brown bark, which is internally white and covers a white woody axis; taste aromatic and sweet.

Recently the drug was chemically examined by Mariano Lozano y Castro,* who obtained the following results:—Moisture, 10·0; ash, 3·75; extracted by petroleum ether (fat, 1·38; resin and volatile oil, 0·12), 1·50; ether extract (crystalline acid, 0·40, fat, 0·50, resin and colour, 2·40), 3·30; alcohol extract (alkaloid and glucose, 9·25; resin, 1·46), 10·71; water extract, gum and sugar, 8·336; starch, 26·5; albuminoids, 1·0; cellulose and lignin, 28·75 per cent. The presence of an alkaloid was inferred from the precipitates obtained in the aqueous solution of the alcohol extract by tannin, picric acid and platinic chloride. Subsequently Mr. Lozano prepared 8 per cent. (40 gms. from 500 gm. of the root) of what he considered nearly pure hydrochlorate of the alkaloid which gave alkaloidal reactions with other reagents (Mayer's and Marmé's), besides those mentioned before. It was obtained by mixing the powdered root with lime and water, after three days treating with water acidulated with HCl, concentrating the filtrate, mixing with alcohol, filtering, evaporating, treating the extract with alcohol, evaporating, taking up with water, repeating these operations several times, and finally decolorizing with animal charcoal. While it is possible, though by no means certain yet, that the root may contain an alkaloid, it has not yet been isolated, and the chemical reactions and the physiological experiments described by Lozano were made with calcium chloride mixed with organic matter of unknown quantity and quality.

Psoralea corylifolia, Roxburgh, is an annual plant with undivided leaves, the seeds of which have been long in use in India as a tonic and deobstruent and in

* 'Synopsis of the Medicinal Botany of the United States.' By J. M. G. Carter, M.D., 1838.

* 'La contrayerba blanca o de México.' Mexico, 1889. Pp. 48.

skin diseases. In 1876 (*Proc. Am. Ph. A.*, 1877, 209), Dymock called attention to the use made in India with the oil expressed from the seeds, and later (*Ibid.* 1882, p. 245), the oleoresin of the seeds diluted with simple unguents was highly lauded for its efficiency in leucoderma. Sometimes it was used mixed with chalmugra oil, to which some of the alleged effects in skin diseases may have been due. But the writer has been unable to find any record of the results of experiments, which were said to have been undertaken in England with the oil and the oleoresin of these seeds, during the years 1881 and 1882.

Whether others of the North American species of Psoralea, besides those mentioned above, possess valuable medicinal properties must be left for future investigations to decide. The genus is certainly an interesting one, notwithstanding the economic and medical uses are confined to a small number of species and to limited localities.

INFUSION OF DIGITALIS.*

BY JOSEPH W. ENGLAND, PH. G.

In the introductory portion of his paper, the author refers in detail to the chemical researches on digitalis, and lays stress upon the fact that the active constituents may be divided into three groups. First, those soluble in alcohol and insoluble or nearly insoluble in water; second those soluble in water and soluble or nearly insoluble in alcohol; third, those soluble in both alcohol and water. Under the first group are placed digitalin and digitoxin; under the second digitonin; under the third digitalëin. The tincture and fluid extract being alcoholic or rather dilute alcoholic preparations, contain most largely digitalin, digitoxin and digitalëin, whilst the infusion, an aqueous preparation, holds in solution digitonin and digitalëin. It is evident from these facts, comments the author, that the custom of making infusion of digitalis from the tincture of the fluid extract, needs to be mentioned only to be condemned, and should never be followed.

To determine the value of an infusion of digitalis, the first step would be to ascertain the percentage of active ingredients and next to standardize. In the absence of standardization the best method would be to ascertain the amount of solids, active and inactive, dissolved. In view of its delicate chemical composition, it is manifest that prolonged heat should not be used to obtain such results, so in all the experiments herein recorded, evaporation of the finished product was not resorted to. The amount of solids dissolved in each fluid ounce was found by taking the specific gravity of the infusion (in a flask holding 32·4 gm. of distilled water, at 70° F.), multiplying it by the weight of a fluid ounce of water and subtracting from the result 455·69 grains.

The first series of experiments made were to determine whether cold or boiling water exerted the greater solvent action upon digitalis, and whether, in each instance, maceration for one, two, three or four hours produced any variation. The results of eight experiments upon the same sample of powdered digitalis (No. 80), 1 drachm to each pint of infusion, were these, that the cold water infusions were lighter in colour than those made with boiling water, and that the specific gravity (1·00154) was identical in *all* cases, whether maceration was for one, two, three or four hours. It may then be deduced that cold water infusions are preferable to those made with boiling water, because, although having the same specific gravity as the latter, they contain a relatively larger percentage of active solids, because the latter hold more colouring matter in solution, and as both exhibit the same amount of dissolved solids it must then contain a smaller quantity of the colourless, active ingredients. This belief is confirmed in the observations of M. Roger*, who found that "the toxicity of digitalis diminishes very notably, when the product of maceration is concentrated by the water-bath. Then, a 5 per cent. maceration, which is toxic in doses of 0·05 gm., no longer kills save in doses of 1·8 gm., when it is concentrated by 4 per cent. If reduced by 6·6 per cent., 3 gms. would be required to produce the same effect." These experiments would then indicate that the use of heat and boiling water, in the preparation of the infusion, should be avoided, for the reasons that the constituents of the leaf are altered in chemical composition; the active ingredients being changed to non-toxic, inactive ones, whilst the non-active colouring matter is rendered more soluble.

In the previous experiments the specific gravity of the finished product (made from 1 drachm of No. 80 digitalis powder to the pint) was 1·00154; showing 0·7 grains of dissolved solids in each fluid ounce of the infusion. Eight more samples were now made, double this strength, with cold water and with boiling water, each, and macerated for one, two, three and four hours; using the same digitalis as previously. The results were all alike (sp. gr. 1·00308), indicating 1·4 gm. of dissolved solids in each fluid ounce.

It became of interest in this connection, to see just how far this regularity of increase of dissolved solids would go, and fourteen infusions of the same sample of powdered (No. 80) digitalis, as previously used, were made of different strengths. The results are these:—

Grains to pint, 60, 120, 130, 140, 160, 180, 200, 240, 300, 360, 420, 480, 720, 960.

Solids in fl. oz., ·7, 1·4, 1·54, 1·68, 1·89, 2·1, 2·38, 2·52, 2·95, 3·51, 4·07, 4·50, 6·35, 8·15.

The regularity of increase seems to be reached with 200 grains to the pint; above that point the increase is variable.

Infusions of the *whole* leaf were now made, taking ten different samples (120 grains to the pint, cold water, two hours' maceration, etc.). With singular unanimity they *all* showed the same specific gravity 1·00308, indicating 1·4 gm. of solids to the fluid ounce, a remarkable constancy in the amount of solids dissolved.

To compare this result with those of infusions made from the No. 80 powder (same strength, conditions, etc.) ten different specimens were made from commercial samples. The results are variable, as follows:—

Solids in fl. oz., 1·4, 1·26, 1·12, 0·98, 1·4, 1·4, 1·4, 1·12, 1·12, 1·26 grains.

It should be mentioned that in all these experiments the so-called English leaves were used. Right here, it is of value to know whether the popular prejudice in favour of the English leaf is founded on any other basis than that of custom. So ten infusions of German digitalis leaves, as found in commerce (120 grains to the pint, cold water, two hours' maceration, etc.), were prepared. The results were as follows:—

Solids in fl. oz., 1·4, 1·12, 1·105, 1·4, 1·105, 1·12, 1·4, 1·26, 1·4, 1·4 grains.

It will be observed that the amount of solids dissolved is not constant, as in the commercial English leaf. Examination of the commercial German leaves reveals the fact that they have not been as carefully selected and freed from stalks, etc., as the English leaves. That the difference in the care of collection and selection is the only difference is shown by the fact, that the infusion when made of leaves selected from each of the ten specimens above evinced 1·4 grains of dissolved solids in each fluid ounce, as in

* From a paper read before the Pennsylvania Pharmaceutical Association, June 5. Reprinted from the *American Journal of Pharmacy*, July.

* Toxic Power of Digitalis; *Nouv. Rem.*, Feb. 24, 1889; *vide Amer. Journ. Pharm.* 1889, p. 174.

the English-leaf infusions, and that the infusion, when made of stalks, etc., selected from each of the ten specimens above gave but 0·98 gr. of dissolved solids in each fluid ounce, indicating that it was the large and varying quantity of stalks in the commercial German leaves which caused the variability in the amount of solids dissolved, and that the English leaves were superior to the German only because the commercial samples of the former were carefully selected and freed from the stalks; thereby reducing the element of variability to a minimum. In point of fact, it has been intimated that some of the English dealers buy their digitalis leaves in the German markets, and select and repack them as English leaves. Whether this is the case or not the writer does not know.

That the small quantity of solids dissolved in the infusion made of stalks shows a low percentage of active ingredients, is indicated by the experiments of Mr. Broeker,* who, while he found about 1 per cent. of digitalin in the parenchyma of the leaf (the stalks and nerves being rejected), found in the stalks and nerves only 0·2 per cent. of that constituent. Moreover, he observed that the presence of these latter is liable to render the infusion gelatinous.

Although digitalin is insoluble in water, and hence the results of Mr. Broeker cannot be used to prove that the stalks are largely destitute of the water-soluble active principles of digitalis, they would indicate that if there was such a radical diminution in the percentage of one active principle, there was in all.

In the U.S.P. infusion of digitalis it will be remembered that powdered cinnamon (No. 20) is directed to be infused in connection with powdered digitalis (No. 20). Cinnamon is here employed, not for any medicinal action it may possess, but solely for the purpose of flavouring; a purpose which it but imperfectly fulfils, through the solution of a small quantity of volatile oil of cinnamon.

It is of interest to know whether the presence of this volatile oil exerts any retarding influence upon the solution of the water-soluble principles of digitalis. To determine this point, infusions were made of digitalis leaves, which had shown 1·4 grains of soluble solids in each fluid ounce of infusion, and cinnamon water, the specific gravity of which was first taken. The result in all cases indicated but 0·98 grains of solids to the fluid ounce, a decrease of 0·42 grains, or 30 per cent. It may be claimed that the officinal infusion of digitalis is by no means analogous to cinnamon water in the amount of volatile oil which it contains. But it seems evident that the presence of that volatile oil, however small it may be in amount, must exert a retarding influence upon the solution of the digitalis principles, and hence powdered cinnamon should be dropped from the officinal formula.

In reducing the strength of infusion of digitalis to 7 grains to each fluid ounce, the Revision Committee, in the opinion of many, altered the quantity in the wrong direction. It should have been increased, if anything. But as the limit of regular saturation appears to be about 200 grains to the pint, it would be better to return to the pharmacopœial strength of 1870, *i.e.*, about 7·5 grains to the fluid ounce, or 120 grains to the pint.

The following is the formula in use by the writer:—

Take of—

Digitalis leaves, bruised	120 grains.
Water	14½ fluid ounces.
Alcohol	1½ „ „

Macerate the digitalis leaves, previously bruised in a Wedgwood mortar for one hour with the water, agitating occasionally. Express, filter and wash the residue placed on the filter with sufficient water to make the filtrate measure 14½ fluid ounces. To this add the alcohol. As made by this formula the infusion is a clear, transparent, amber-coloured liquid, darkening in colour on keeping for several days; characteristic in odour and bitter in taste. It is well, in view of the ready decomposition of such a weakly alcoholic solution, to make only such quantities as will last but a short time, or, better still, to make it extemporaneously. This latter method is readily practicable with such a short period of maceration. In the preparation of infusion of digitalis there is urged the usage of the English leaf, or the German leaf selected and freed from stalks; the employment of the whole leaf, broken up as above directed, instead of a No. 20 powder; cold water maceration instead of boiling water infusion, for reasons previously mentioned; the omission of powdered cinnamon, as retarding the solution of the digitalis principles and as of no special value as a flavour; and, lastly, one hour's maceration as all sufficient for the solution of the water-soluble digitalis principles.

* *Amer. Drug.*, Jan. 1888, p. 10. From *Niew Tijdschr. voor de Pharm. in Netherland.*

CANAIGRE.*

BY HENRY TRIMBLE.

The following account of a tanning material, which has several times in the past few years been mentioned as new, or as a possibility for the tanner, is undertaken with a view of relating what has been done toward developing this source, and at the same time calling attention to the fact that if we encourage home production we have in canaigre a material which gives promise of superseding the uncertain and much adulterated gambier.

Canaigre is found in large quantity in the sandy soil on both sides of the Rio Grande and northward over a large portion of Western Texas and New Mexico.

Its history is briefly as follows:—It is said to have been used in tanning by the Mexicans for over two centuries. Our first information, however, dates from July 9, 1868, when a package of these roots was forwarded for Mr. John James, of San Antonio, Texas, to the Agricultural Department at Washington, together with a letter stating that Mr. F. Kalteyer, chemist in San Antonio, had found them to contain 32 per cent. of tannin. This sample was mislaid or overlooked until 1878, when it was reported on by the chemist.† It was then found to yield 23·45 per cent. of tannin. A fresh sample was also procured and the tannin estimated in the still fresh root with almost identical results, after making due allowance for difference in moisture. The other constituents reported at that time need not claim our attention at present further than to notice a considerable amount of starch, 18·00 per cent.

Previous to this publication by the Government, Mr. Rudolph Vœlcker, of Galveston, Texas, published‡ an analysis of roots gathered in July, 1874. He found 23·16 per cent. tannin, and proved the presence of chrysophanic acid and aporetin. He was not aware of the botanical origin of the plant, but supposed it to belong to the natural order Polygonaceæ.

In 1879, Mr. Wm. Saunders§ in his report on canaigre stated it was the *Rumex hymenosepalum* of Torrey,

* Contribution from the Chemical Laboratory of the Philadelphia College of Pharmacy. No. 56. From the *American Journal of Pharmacy*, August.

† Report of the Commissioner of Agriculture, 1878, p. 119.

‡ An Analysis of Raiz del Indio, *American Journal of Pharmacy*, 1876, p. 49.

§ Report of the Commissioner of Agriculture, 1879, p. 364.

and furnished a lithographic plate of the plant in bloom.

At the New Orleans Exposition, 1885–86, in one corner of the section devoted to products from New Mexico were some of these roots, above which was the inscription, "A new tanning material."

As will be shown later, this exhibit, insignificant as it appeared, attracted the attention of at least one person.

In 1886,* a sample of a root sent to me from San Antonio, Texas, under the name of "Indian Root," was analysed and the results published under the title of "Yerba del Indio," from the impression it was the *Aristolochia fœtida* of the Mexican Pharmacopœia. This impression, however, was corrected by Professor J. M. Maisch in the same issue, page 115. He suggested, and it has since been found to be correct, that this "Raiz del Indio" was the canaigre root. That analysis fixed the amount of tannin at 11·66 per cent., but it was found that the root, which was not analysed as soon as received, had commenced to decay and, later, it was completely riddled by insects. In this respect my experience differed from that of the Government chemist, who found no change after ten years.

Soon after the New Orleans Exposition samples of two or three hundred pounds were sent to Chicago for experiments in a number of tanneries there. Mr. E. C. Denig of that city has devoted much time since then to studying this material, from its source in Texas and New Mexico to its application in the tanning of hides.

Canaigre consists of heavy globular and fusiform pieces from two to six inches long and one to three inches in diameter. Externally it is of a dark, reddish-brown colour, becoming, by age, almost black; internally it is from a bright to a brownish-yellow according to age and amount of exposure to atmosphere. When collected the roots consist of clusters resembling sweet potatoes. They are found near the surface or sometimes on top of the ground, are rapidly dried and, at a certain stage, cut into small pieces. If allowed to get very dry they become so hard as to resist any ordinary method of cutting. From samples of the whole and clipped root, kindly furnished me by Mr. Denig, I have found 17·33 per cent. of tannin. This figure is rather lower than that obtained by other investigators, but the deficiency may be explained by my sample containing more moisture. Dr. H. E. Sturcke† has found a total of 28·57 per cent. tannin.

The ground root is at present used in a number of tanneries and has been found to more closely resemble gambier in its action than any other tannin material. An extract has also been prepared and used which contains from 40 to 60 per cent. tannin, and it is thought that in this form it will probably replace gambier. Should the hopes and efforts of those who are engaged in the development of this material be realized, we will have a source of tannin which is said to be inexhaustible, and which will be the means of either bringing a better gambier into this market or of driving it entirely out of use here. It is said that the dried and ground root can be delivered in any part of the United States at a price not exceeding 3 cents per pound.

Thus after a delay of twenty years this root has reached that stage of practical application when a useful future may be predicted for it, and the persistent efforts of the past four years have every prospect of being rewarded.

The presence of so much starch in a tanning material is, perhaps, without precedent, and there are good reasons why this is no disadvantage. The properties of the pure tannin have not been investigated, and it is not known whether canaigre red or gallic acid is the product of its decomposition. Crystals have been obtained by agitating an aqueous extract of the root with ether, which do not resemble either gallic acid or catchin.

This crystalline compound and the pure tannin are under investigation by me at the present time.

* An Analysis of *Aristolochia fœtida*, *American Journal of Pharmacy*, 1886, p. 113.

† *Shoe and Leather Reporter*, Oct. 27, 1887, p. 882.

A NEW MEDIUM FOR MOUNTING STARCHES AND POLLENS.*

BY A. P. BROWN, PH.G.

Having occasion to mount a variety of starches for examination under the microscope, I have been looking for a suitable medium that would best show the structure and at the same time preserve the specimen. Balsam of fir makes starches too transparent. Glycerin is good, but it is almost impossible to find a cement that would hold it, on account of its solvent properties. Carbolic acid and water in time dry out. Cosmolin has been recommended, but it is too greasy, and it has the same fault as glycerin; it is almost impossible to find a cement that will hold it.

A short time ago Mr. Charles Bullock spoke to me of a new medium he had been using to mount vegetable tissues; it struck me as being the very article for mounting starches in. I prepared some and found it to answer the purpose admirably; it is as follows:—

Selected gum arabic	℥ij.
Glycerin	
Distilled water, of each	f℥iss.
Thymol	gr. j.

These are all placed in a wide-mouthed bottle, which is corked carefully to exclude dust, and placed in a warm situation. It takes several days to effect a perfect solution, the mixture being stirred up occasionally. When all is dissolved strain through linen, and set aside the liquid about a week longer to get rid of air bubbles and to allow any small particles that may have passed through the strainer to settle to the bottom; or it can be filtered through absorbent cotton by using a funnel for hot filtration, which consists of a double tin case holding water, kept at the required temperature by a spirit lamp placed under the projecting arm. A glass funnel fits inside the hot water bath, a plug of absorbent cotton is placed in the funnel, and the solution is passed through it. After filtration it is best preserved in compressible tubes.

To mount starches or pollens, a clean slide is breathed on and then dusted over with the starch or pollen to be mounted; the surplus is removed by gently tapping the slide against any hard substance—a table, for instance. Enough of the starch will adhere to the slide, and will be nicely distributed over the field. A drop of the mounting medium is now placed on the slide carefully and the cover placed over it. If there are any air bubbles in the mounting medium when placed on the slide they should be carefully picked out with a mounting needle. If the medium is kept in a compressible tube there is not much danger of air bubbles on squeezing out a drop; or if there are any, they will be on the surface, and can be readily removed with a mounting needle. The slide can then be finished immediately by running a ring of any kind of cement round the edges of the cover glass, and the mount is permanent.

The medium can be coloured blue by adding a small quantity of aniline blue, although it is not necessary, as the structure of the starches can be plainly seen. They should be examined by central and oblique illumination, and with the polariscope, to give the student interested in this subject an idea of the beauty of starches and pollens.

* From the *American Journal of Pharmacy*, April.

The Pharmaceutical Journal.

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TOPICS DISCUSSED AT THE LEEDS MEETING OF THE BRITISH MEDICAL ASSOCIATION.

THE enormous area of the field included within the purview of the numerous sections of the British Medical Association almost ensures that here and there points of discussion shall crop up presenting nearly as much interest to the pharmacist and chemist as to the medical practitioner. The publication in the journal of the Association of a detailed account of the business transacted in the different sections at the recent meeting shows in fact that such topics were fairly numerously represented at Leeds, and in this number of the Journal opportunity has been taken to reproduce one or two communications that may be said to lie on the border-land. For instance, the paper by which Dr. FRANKLIN PARSONS, Medical Inspector to the Local Government Board, introduced the discussion in the Public Medicine Section on Disinfection and Isolation, besides indicating the wisest steps to be taken by the Medical Officer who has to battle with an outbreak of epidemic disease, is full of information respecting disinfectants useful to the pharmacist who may be called upon to distribute them to the public. Dr. PARSONS, it will be noticed, limits the definition of the word "disinfection" to the destruction of that matter which produced by a sick person and received into the system of a healthy one has the power of causing in the latter a disease similar to that from which the former was suffering. This definition draws a line between true disinfectants, on the one hand, and antiseptics, which merely retard or prevent putrefaction, as KOCH has shown to be the case with carbolic acid, and simple deodorants on the other. In the case of some diseases, the organized matter requiring to be destroyed to the extent of depriving it of its pathogenic properties has been recognized, as in anthrax, relapsing fever, septicæmia and tuberculosis; in others, as cholera, scarlatina, diphtheria, and enteric fever, organisms have been discovered that are suspected to be connected with the causation of the respective diseases; and in others no such organisms have been discovered, though it is assumed that they exist. Some of these organisms, especially those bearing spores, are very resistent to ordinary destructive agents, and as the spores of the anthrax bacillus are extremely tenacious of life they are commonly used as an experimental material, on the assumption that a substance that can rob them of their hurtful properties will affect similarly all other disease germs. In Dr. PARSONS's communication will be found a very inclusive *résumé* of the results obtained by KOCH, KLEIN and others, in treating these anthrax germs with the principal reputed disinfectants, and it will be observed that the author has a high opinion of the powers of corrosive sublimate, boiling water, and steam heat. Evidently he has not an unduly high opinion of the class of more or less volatile substances which are supposed to be useful in disinfecting the air of sick chambers, for he remarks that active chemicals, if present in sufficient quantity to be effective as disinfectants, would render the air irrespirable. In fact, Dr. PARSONS has more faith in getting rid of the foul atmosphere and letting its place be taken by a supply of fresh air, on the ground that the contagia of most infectious diseases, with the notable exception, however, of small pox, appear to be destroyed when freely diluted with air. For some of the possible carriers of infection fire is commended as the best disinfectant, as for instance the discharges from the throat and nostrils in scarlatina and diphtheria, which should be received on pieces of rag and burnt. For the disinfection of typhoid and other excreta a liquid consisting of half an ounce of corrosive sublimate and an ounce of hydrochloric acid dissolved in five gallons of water is recommended, which as a measure of precaution against mistaken use should be coloured by the addition of five grains of aniline blue. Many useful hints are also given as to the disinfection of bedding and similar articles, and other points upon which the pharmacist is not unfrequently consulted by the public.

In another paper read in the same section on the "Physiological Value of Meat Food for Invalids and Waste in Methods of Preparation," Mr. E. M. JESSOP dealt with the physiological aspect of a subject upon which the pharmacists have already brought to bear a considerable amount of practical skill. It may be thought by some readers that the author is somewhat dogmatic, and refers to the human body too much as if it were a huge test-tube, full of known reagents, surrounded by exactly ascertained conditions; but in denouncing the abominations that commonly pass muster in the sick room as "beef-tea," and in recalling attention to the true nature of many of the "meat extracts," there can be no doubt that Mr. JESSOP does useful service. On the other hand, it may be remarked that when an ounce of meat has been introduced into the stomach of a sick person in the form recommended by the author, so that there should be "neither refuse

nor remainder," it does not follow that the 14·22 grains of nitrogen it is supposed to contain, or any great part of it, will be assimilated. A great deal of nonsense has been published as to the relative alimentary value of various substances, based upon a knowledge of their elementary composition, but vitiated by ignorance as to their behaviour in the stomach into which they are supposed to be introduced. In this case, Mr. JESSOP, however, says that his theory is confirmed by experience, and at the least it must be admitted that his plan has the advantage of presenting to the stomach an important food constituent that is notoriously absent from some preparations of meat.

Still another discussion that took place in the Section of Public Health, on the "Contamination of Drinking Water by Lead," was one in which the chemist is particularly interested. It was introduced by Dr. SINCLAIR WHITE, Medical Officer of Health at Sheffield, to whose investigation as to the cause of a recent outbreak of "plumbism" in that town reference was made in this Journal when commenting last April upon the report of the Medical Officer to the Local Government Board. As a *résumé* of the results obtained was given on that occasion, and no particularly new points were brought forward at Leeds, it has not been thought necessary to reproduce this later paper. It will suffice to recall that Dr. WHITE found the moorland water, to the action of which upon the lead supply pipes the mischief was attributed, to be distinctly acid, and that the acidity and consequent power to remove lead could be removed by filtration, or on the large scale, by contact for a few hours with freshly-broken limestone. As to the nature of the acid Dr. WHITE said nothing had been determined, though he inclined to the opinion that it was an organic compound derived from decaying peat. In the course of the discussion, however, Dr. BROWN, of Bacup, said that a Lancashire drinking water examined by him owed its acidity to free sulphuric acid.

Lastly, the report of Dr. SIDNEY MARTIN to the Scientific Grants Committee of the British Medical Association upon the nature of the jequirity poison, practically brought to a close an investigation, the earlier stages of which were recorded in this Journal soon after the seeds of *Abrus precatorius* had been introduced into ophthalmological practice. It will be seen that Dr. MARTIN refers the toxic action of jequirity seeds to two proteids—a globulin and an albumose—which are similar in their action, are rendered inert by a temperature below that of boiling water, and bear some resemblance to snake venom, though far from identical with it. Some doubt still exists as to whether these proteids are poisonous in themselves or whether they owe their toxic power to some other body linked to or formed from them. Such a substance would probably be a ferment, and the destruction of activity by heat would point in this direction, but it may also be due to an alteration in the molecular constitution of the proteid itself.

BRITISH PHARMACEUTICAL CONFERENCE.

ON Monday next the proceedings in connection with the visit of the British Pharmaceutical Conference to Newcastle-upon-Tyne will commence, and it may therefore be useful to some readers to present a brief *résumé* of the programme of the local arrangements in its latest form. As previously announced on Monday evening, at eight o'clock, a Reception will be held by the President, Mr. C. UMNEY, and other officers of the Conference at the University of Durham College of Science, Barras Bridge, which will be followed by a Conversazione and Concert. At ten o'clock there will be a meeting of the Executive Committee to arrange the business of the following day. The General Meetings of the Conference will be held in the Physical Lecture Theatre of the College, commencing at ten o'clock on Tuesday morning. At one o'clock there will be an adjournment for luncheon, which will be provided at Cambridge Hall, Bath Road. Resuming at two o'clock, the reading and discussion of papers will be continued until four o'clock, when an "afternoon tea," provided at the College, will be followed by a drive through the parks and a visit to Jesmond Dene. On Wednesday the arrangements will be the same as on the previous day, except that the "afternoon tea" will be followed by an excursion down the Tyne by special steamer leaving Quayside Landing Stage at a quarter-past four o'clock. On Thursday the members will meet at the Central Station, from whence they will be taken by special train to Hexham, where visits will be made to Duke's House Grounds, open by permission of Mrs. BACKHOUSE, and other places of interest, including one to the Abbey Church. At noon luncheon will be served in the Town Hall, after which the party will travel by special train to Rothbury, and by permission of Lord ARMSTRONG will have an opportunity to visit the beautiful grounds of Craigside. Between five and six o'clock tea will be provided, after which the company will travel by train *viâ* Morpeth to Newcastle, arriving shortly before 8 o'clock.

It may be as well to add that in accordance with the decision of the Conference participation in the future proceedings now involves contribution towards the expenses. The set of tickets admitting to the luncheons and teas, the carriage drive and the steamboat excursion on Tuesday and Wednesday, will cost 5*s*., and the set of tickets for the excursion on Thursday will cost 10*s*. 6*d*. Application for these tickets, where this has been neglected, should be made at once to the Honorary Local Secretary, Mr. T. MALTBY CLAGUE, 11, Grey Street, Newcastle.

The following titles of papers to be read have been received in addition to those already published:—

Note on Volumetric Process for the Assay of Ipecacuanha. By T. P. BLUNT, M.A.

The Strength of Commercial Specimens of Scheele's Prussic Acid. By R. WRIGHT.

The Relative Value of Alcohol and Chloroform and Mixtures of the two for the Extraction of Aconite and Belladonna Roots. By R. WRIGHT.

An Impurity in a Commercial Sample of Sodium Salicylate. By R. WRIGHT.

Arsenic in Glycerine. By L. SIEBOLD, F.I.C., F.C.S.

Note on Lemon Juice. By J. P. WILLIAMS, F.C.S.

Tannin: Its Solubilities, etc. By B. S. PROCTOR, F.I.C.

Narceine and its Salts. By D. B. DOTT.

British Medical Association.

DISINFECTION.*

BY H. FRANKLIN PARSONS, M.D.,
Medical Inspector, Local Government Board.

The invitation of my friend and colleague, the President of the Public Medicine Section, must be my excuse for submitting to the Section, as a text for discussion, the following remarks on disinfection with reference to the control of epidemics.

By disinfection I mean the destruction of infection—the destroying of the activity of that matter which, produced by a sick person and received into the system of a healthy one, has the power of causing in the latter a disease similar to that from which the former was suffering. In popular language the word disinfection is used to include the use of substances ("deodorants") which destroy offensive odours, and "antiseptics" which prevent or retard putrefaction, but I shall employ it in its strict etymological sense.

What, then, is the nature of this infective matter which in the interests of the public health we seek to destroy? It is known that it is organic matter, and particulate—that is, solid, not liquid or gaseous—matter, although the fine colourless particles of which it is composed may be freely suspended in both water and air. There is reason also to believe that it is in all cases living matter, and consists of microscopic vegetable organisms. The analogy between the life history of infectious fevers and that of the yeast plant in a saccharine solution long ago suggested to Liebig this view—a view embodied in the term "zymotic," often applied to such diseases. Modern research has shown that certain diseases in men and animals are undoubtedly caused by the presence in the system of micro-organisms, and are communicable by the inoculation of such organisms. Among these I may mention two acute febrile diseases, namely, anthrax and relapsing fever; acute suppuration and various forms of septicæmia; the chronic diseases, tuberculosis and leprosy; also fowl cholera and infectious pneumo-enteritis of the pig, "swine fever." The last-named disease has an interesting resemblance to the common human infectious disorders, in that the contagium may be transmitted through the air, and attaches itself to places in which the affected animals are kept. In other diseases, as Asiatic cholera, scarlatina, diphtheria, and enteric fever, certain micro-organisms have been found and have been looked upon with more or less probability as the cause of the disease; but the connection is not perhaps as yet completely established, mainly owing to the difficulty of testing it by the results of inoculation on animals. In other infectious diseases, again, as small-pox, measles, and whooping-cough, no such organism has, I believe, as yet been identified; but we may probably for our present purpose, without much risk of error, assume the *materies morbi* in these also to be a living organism. This assumption furnishes us with a practical means of testing the efficacy of the agents we employ to destroy infection. It is in most cases not practicable to test directly the effect of our disinfecting agents upon the contagia of the ordinary infectious diseases of mankind, for the reason that we cannot make the necessary experiments (including control experiments with undisinfected portions of material) upon human beings; and these diseases cannot, or cannot with certainty, be produced by inoculation in the lower animals. If, however, we choose the most refractory organism, pathogenic to animals, that we can find, and ascertain how it may be killed, we shall be tolerably safe in assuming that the same means will kill the contagia of the infectious diseases of mankind, with which as sanitarians we have to do. Now certain of the pathogenic micro-organisms, bacilli, have the property of forming spores, and these spores are found to be more resistent than the fully developed organism, just as a grain of wheat will survive treatment, such as drying and dipping in poisonous solutions, which would kill a growing wheat plant. Of the pathogenic microbes, the most convenient for the purpose of testing disinfecting agents is the *bacillus anthracis*; it forms, under certain circumstances, spores which are exceedingly tenacious of life; it can be cultivated, and is easily recognized both by its microscopic characters and its appearance when growing; and, if inoculated into animals, it produces in them with certainty the disease known as anthrax. None of the ordinary infectious diseases of mankind are known to be caused by spore-bearing microbes (though it is possible that small-pox, the contagium of which is very tenacious of life, may turn out to be so); and so far as our present knowledge and experience go, we may assume that means which will destroy the spores of the *bacillus anthracis* may be relied on as efficacious for our purpose, though it does not follow that agents which do not destroy the *bacillus anthracis* are, therefore, useless against the less resisting contagia of other diseases.

An extensive and important series of researches upon the efficacy of disinfectants, conducted by Koch and his coadjutors for the German Imperial Board of Health, is in large part the foundation of our modern knowledge on the subject, though his results have been confirmed and extended by other workers, as Dr. Klein in this country, and a committee of the American Medical Association in the United States. Koch employed both spore-bearing and non-spore-bearing organisms of several kinds. Threads steeped in cultures of these were exposed to the action of disinfectants and tested by cultivation or by inoculation on animals. The general result of the experiments with chemical agents was to show the comparative or entire inertness as germicides of many of the substances commonly considered disinfectants. Carbolic acid was found to have a powerful restraining effect upon the growth of bacteria, but was much less efficacious in destroying their vitality. To kill spore-bearing forms it was necessary to steep them for one or two days in a 5 per cent. watery solution; a 2 per cent. solution only killed them at the end of a week; while a 1 per cent. solution did not kill them in fifteen days. Solutions of carbolic acid in alcohol or oil had not the smallest disinfecting effect; 5 per cent. solutions did not kill spore-bearing bacilli however long they were exposed to their action. Vapour of carbolic acid at ordinary temperatures had no destructive effect on spore-bearing bacilli, though some effect was produced at elevated temperatures. In other cases also it was found that the disinfecting effect of substances in the form of vapour was increased by elevation of temperature; thus spores of bacilli in garden earth were killed in two hours by exposure at a temperature of 176° F. to the vapour of bisulphide of carbon, although neither a temperature of 176° in dry air nor the vapour of bisulphide of carbon in equal concentration at ordinary temperatures had any destructive action at all on them.

Sulphurous acid gas was found efficacious for the destruction of non-spore-bearing organisms. Exposure to 1 part in 100 of air killed micrococci, if dry, in twenty minutes; if moist, in one minute. Spore-bearing-forms, however, were not killed, even after four days' exposure to a 6 per cent. gaseous mixture of sulphuric acid in air. Chloride of zinc had no disinfecting

* Paper read to introduce a discussion on Disinfection and Isolation; with special reference to the control of Epidemics, in the Section of Public Medicine at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

effect; spores of anthrax bacillus which had remained for a month in a 5 per cent. solution were in no way affected. Absolute alcohol, glycerine, chloroform, sulphates of copper, zinc, alumina and iron (5 per cent. watery solutions), and boracic acid (5 per cent.) were not found to have any destructive effect on the spores of bacillus anthracis. These spores were, however, destroyed by exposure for one day to the action in watery solution of either of the above substances, namely chlorine, bromine (2 per cent.), iodine, corrosive sublimate (1 per cent.), permanganate of potash (5 per cent.), and osmic acid (1 per cent.). They were also destroyed after longer periods by the following substances, namely ether, oil of turpentine, hydrochloric acid, chloride of iron (5 per cent.), arsenious acid (1 per cent.), chloride of lime (5 per cent.), and quinine (1 per cent.).

Experimenting with heat in the dry form, Koch found that bacteria free from spores could not withstand an exposure of an hour and a half to a temperature of a little over 212° F. in hot air, but that spores of bacilli were only destroyed by remaining three hours in hot air at 284°. He also found that in hot air the temperature penetrated so slowly that, after three or four hours' heating to 284°, articles such as small bundles of clothes and pillows were not disinfected, and that by heat of this degree and duration most textile materials were more or less injured. The results with steam were strikingly superior. It was found that an exposure of five minutes to steam at 212° was sufficient to kill the spores of the bacillus anthracis, and that the penetration of heat into articles exposed to steam took place far more rapidly than into the same articles exposed to hot air.

A series of experiments made by Dr. Klein and myself on disinfection by heat confirm, on the whole, the results of Koch. The materials experimented with were spore-bearing cultures of anthrax bacillus, anthrax blood free from spores, bacilli of swine fever, and tuberculous pus; and the results were tested by inoculation on animals. Our results were more favourable to the efficacy of dry heat than those of Koch. We found that spores of bacillus anthracis were killed by exposure for four hours to a temperature between 212° and 216° F., or for one hour to 245°. Non-spore-bearing bacilli were rendered inert by one hour's exposure to 212° to 218°. Anthrax spores were killed by boiling for one minute in water, or by exposure for more than five minutes to steam at 212°. We also found steam heat to penetrate far more rapidly than dry heat. Similar results have been obtained by other observers, so that the superiority of steam over hot air as a disinfectant may be looked upon as thoroughly established. With a view to ascertain whether the advantages of steam could be obtained while avoiding certain inconveniences in its use, we made some experiments with hot moist air, but the result was that, while the moistening of the air aided the penetration of heat, it did not up to the point of one-third saturation render it more effectual in killing bacilli than dry air.

Burning, of course, is a very thorough means of disinfection.

It is characteristic of the class of infectious diseases that the morbid poison which produces any such disease multiplies in the body of the patient, and is given off again from it, and that it continues thus to propagate itself for a considerable period—often for several weeks. The poison is believed to be especially given off from the part of the body upon which its local effects are manifested, as from the skin in small-pox; from the skin and throat, and perhaps the kidneys, in scarlet fever; in discharges from the throat and nostrils in diphtheria, and from the bowels in enteric fever and cholera. There is reason to think, also, that the contagia of some at least of these diseases can multiply in suitable media outside the body, as in milk, sewage, soiled linen, or moist sewage-contaminated soil; perhaps, also, even in potable water. On the other hand, some of the pathogenic organisms are found to perish as putrefaction advances, either through the formation by them of chemical compounds antagonistic to their own life, or through the competition of the ordinary putrefactive forms, just as in a neglected garden the exotic flowers are choked or stifled by the ranker growth of the indigenous weeds.

Contagia are not as a rule permanently destroyed by cold, though that of yellow fever is so. They also in general are able to survive drying, though Koch states that drying is fatal to the *comma bacillus* which he finds in Asiatic cholera.

The matters which may act as carriers of infection, and may thus require disinfection, are: 1. The body of the patient, living or dead. 2. The discharges given off from the body of the patient, and more particularly those from the organs specially affected by the disease, for example, the exfoliating scarf skin in small pox and scarlet fever; the discharges from the throat and nostrils in scarlet fever and diphtheria, and those from the bowels in enteric fever and cholera. 3. The air tainted from exhalations from the sick; the poison probably existing therein in the form of suspended particles. 4. The clothes, bedding, and other articles used by the sick. 5. Articles of food, as milk and water. 6. Walls, floors, etc., of dwellings occupied by the sick, especially dust and dirt lodging upon the walls, and dirt accumulating in the cracks of the floor. 7. Collections of filth, as sewage, especially in a stagnant state, or deposited in or encrusting the sides of foul drains; foul ground surfaces and subsoil.

The processes of disinfection applicable to the living body, such as baths, inunctions, lotions, and dressings, come within the province of curative medicine and surgery rather than that of public health.

For the prevention of the spread of infection from the corpses of persons who have died of infectious diseases the means usually employed are enclosure in a more or less air-tight coffin with chloride of lime or charcoal, and early burial, and I do not think that anything more is necessary. I have never found any reason to think that a body lying undisturbed surrounded by plenty of earth of a suitable nature is a danger to the public health. The advocates of cremation refer to the observations of Pasteur that cattle grazing in a field in which the bodies of others that have died of anthrax have been buried have contracted the disease; and that the spores of the *bacillus anthracis* are found in the superficial mould over the graves, being brought to the surface by earth worms; but, as I have mentioned, the spores of the anthrax bacillus are exceptionally tenacious of life.

It is not of much use attempting to disinfect the infected air of sick rooms by chemical means, for active chemicals, if present in sufficient quantity to be effective as disinfectants, would render the air irrespirable. It is easier to get rid of it, and let its place be taken by fresh air. The contagia of most infectious diseases appear to be destroyed when freely diluted with fresh air. The poison of typhus fever is notably so, but that of small-pox does not appear to be, as Mr. Power has shown that small-pox may be disseminated through the air for considerable distances around a hospital in which many cases of that disease are under treatment. To avoid this it has been proposed that instead of ventilating small-pox wards into the open air, the air from them should be extracted through a flue and burnt in a furnace; or I might suggest that a steam blast might be used to extract the air and disinfect it at the same time. A recent invention of ventilating sewers uses a circle of gas burners for creating an up current of air, and passes the extracted

air through the flames with a view to disinfect it. The offensive, and possibly infected, vapours from refuse destructors and the caldrons used in bone boiling and similar trades are best destroyed by passing them through a furnace.

For the disinfection of the discharges of the sick chemical agents must, as a rule, be used, though the discharges from the throat and nostrils in diphtheria and scarlatina are best received upon pieces of rag and burnt. It is of prime importance that infectious discharges should be disinfected immediately on being passed from the body, both because delay will give them more opportunity of causing mischief, and also because if the infected matter be mixed with a large quantity of other organic matters, as in a drain or privy, before the disinfectant is applied, the action of the latter will have to be exerted on a greater mass of material, and its effect will be *pro tanto* weakened; and the chances will also be great that portions of the infective material will escape its action. It is thought by some that germs of enteric fever, for instance, may long lurk unsuspected in defective drains and privies until some accidental circumstance, such as disturbance of the contents, brings them into activity, and that many of the "sporadic" cases of this disease thus arise.

Of chemical disinfectants for the disinfection of excreta, corrosive sublimate is probably the most trustworthy and suitable for ordinary use. In its use, however, three precautions have to be borne in mind. 1. It is very poisonous, and hence, in order to avoid accidents (such as frequently occur with carbolic acid), the solution should be coloured, as with permanganate of potash, sulphate of copper, or aniline blue. 2. It corrodes iron and other common metals, and is instantly decomposed by contact with them, hence it must be used in non-metallic vessels. 3. It forms with albumen an inert insoluble compound, but this may be prevented by acidulating the solution. A solution suitable for disinfection of excreta, clothing, etc., is made by dissolving $\frac{1}{2}$ ounce of corrosive sublimate with 1 ounce of hydrochloric acid and 5 grains of aniline blue in 3 gallons of water.

Chloride of lime is a useful disinfectant for excreta, but too strong a solution injures clothing. Carbolic acid is especially an antiseptic, retarding putrefaction, for example, in sewage, but a 5 per cent. solution is recommended by Koch by preference for disinfecting excreta and soiled linen of cholera patients. Creolin, a substance allied to carbolic acid, is said by recent experimenters to exceed it in destructive action upon spores of bacilli, at the same time that it is not poisonous to human beings. Permanganate of potash is an excellent deodorant, and has the advantage of not being poisonous. It is also, to some extent, a true disinfectant, but its action upon infective matter is much weakened when this is mixed with a quantity of other organic matter. Green copperas (ferrous sulphate) is a cheap deodorant, but, according to Koch, is not a disinfectant proper. Its habitual use for flushing sewers in time of cholera was strongly recommended by Dr. Budd, and was said at Bristol to have produced excellent results.

With regard to the disinfection of clothing, bedding, etc., used by the sick, it may in the first place be pointed out that for such articles as will stand it, boiling in water for, say, five minutes is an effectual means of disinfection. And, since the infectious matters are not actually incorporated with the fibres of the fabric, but merely attached as dirt to their outside, there is reason to think that even a thorough ordinary washing will be a sufficient disinfection, so far as the articles themselves are concerned; but the infectious properties are transferred to the water in which they have been washed. The dangerous properties of such water are shown by the frequency with which cholera is contracted by those who wash the linen of cholera patients, and by cases like that at Moseley, recorded by Dr. Ballard, where an outbreak of enteric fever occurred among the persons drinking the water of a well into which had percolated the soapsuds in which the soiled linen of an enteric fever patient had been washed. To avoid such risks it is necessary that infected articles which are washable should be disinfected before being washed; this should, for obvious reasons, be done immediately on their being left off. Boiling might be used for this purpose; but boiling water in sufficient quantity is not always at hand; and again, if soiled clothes are boiled, the coagulation of albuminous matters fixes stains in them and spoils their colour. Hence it is more convenient to put the clothes to steep in some chemical disinfecting solution, of which a panful should be kept in readiness. A solution of corrosive sublimate is the best for this purpose, as, besides being the most effective, it has the advantage that it does not change or rot the linen. When the grosser dirt has been removed by rinsing in water, the articles may be boiled.

Articles which cannot be boiled in water without injury, such as cloth clothes, blankets, and beds, are best disinfected by exposure to heat, and the experiments which I have quoted show that for this purpose a steam heat is preferable to a dry heat for several reasons, especially because a lower temperature and a shorter exposure suffice to kill infective organisms, and because a steam heat penetrates much more rapidly than a dry heat into bulky and badly conducted articles. Further advantages are that in a steam apparatus the temperature is approximately equal in all parts, that it can be accurately ascertained, and kept constant at any required degree for any length of time—conditions which are essential to a good apparatus, but which are very difficult to obtain where dry heat is employed. Of dry heat apparatus known to me, Dr. Ransom's self-regulating gas disinfecting stove is the only one in which these conditions are successfully complied with. In several kinds of disinfecting ovens frequently used I found a wide difference, sometimes as much as much as 100° F., between the temperatures in different parts of the heated chamber, and the thermometer used to indicate the temperature did not do so by a wide interval, again sometimes by as much as 100°. Also in ovens heated by coal or coke it is difficult to regulate the temperature so as to keep it near the required point. The result of such defects is apt to be either that clothes are scorched and spoiled, or that, on the other hand, with a view to avoid this, they are so insufficiently heated as not to be thoroughly disinfected.

With care and in a suitable apparatus most articles can be submitted to either dry or steam heat without serious injury, but leather is instantly destroyed by steam. Books, in these days of free libraries, sometimes want to be disinfected; it may be done by exposing them to dry heat, the covers being held back so as to open out the leaves and allow the heat to penetrate. Steam is inadmissible, as it would soften the glue and destroy the leather. Letters may be disinfected by heat, but the effect upon sealing-wax and of steam in loosening the gum of envelopes must be remembered.

A process suitable for the disinfection of rags and paper and shoddy mills is a great desideratum; the requisites being that it shall be cheap, rapid, and effectual, and applicable to rags in the bale without unpacking. An American process attempted to do this by forcing steam into the bale through hollow screws; but it was found that the heat was not uniformly distributed. The infection from which rag-workers incur most danger is that of small-pox, the contagium of which is the most persistent of any of the common infectious diseases, though I could quote

cases which show that the contagia of scarlet fever and diphtheria may retain their activity a long time in articles that are kept shut up and not exposed to the air. Outbreaks of small-pox occur from time to time among workers both in linen and cotton, and in woollen rags, but are most frequent at paper mills where the best writing paper is made, the reason being that such paper is made from white linen rags, the remains of articles that have come into close contact with human bodies. Unfortunately there are no means of recognizing infected rags except by their effects, which are not manifested until too late for preventive measures to be of any use. It is not practicable to insist on the disinfection of all rags, and it is not possible to say which rags ought to be disinfected and which it is not necessary to disinfect. Fortunately, against small-pox—the only disease from which rag-workers incur risk—they have in re-vaccination an effectual protection.

As regards disinfection of food, no one would, I presume, willingly eat or drink articles that he knew to be infected. As, however, one cannot always guarantee the absence of infection in the viands we eat or the water or milk that we drink, it is satisfactory to know that boiling or thorough cooking may be trusted to secure complete disinfection. In the experiments I have quoted it was found that even the very refractory spore-bearing bacilli of anthrax were destroyed by one minute's boiling in water at 212° F., though certain non-pathogenic bacilli found in vegetables and milk require for sterilization a higher temperature or more prolonged boiling, a fact familiar to the housekeeper who makes jam. It is doubtless owing to the efficiency of cooking as a disinfectant that sanitarians in France and Germany, where milk is, I believe, always boiled before use, are sceptical as to the possibility of the propagation of infectious disease by that medium; whereas with us in England, where milk is drunk raw, epidemics of milk origin are a matter of almost every-day experience. On the other hand, trichinosis, so common among the Germans, who eat the ham raw, that it has to be guarded against by an elaborate system of microscopic examination of all slaughtered swine, is practically unknown as a human disease in England and France, where meat is always cooked.

The case of the Welbeck outbreak in 1880, investigated by the President of our Section, in which a number of persons were seized with an acute specific diarrhœa after eating cooked ham at an auction, may at first sight appear to disprove the efficacy of cooking, as the disease was proved to be caused by a spore-bearing bacillus which was present both in the raw ham and in that which had been cooked. The explanation, however, is probably that the cooking had not been sufficient, of which there was evidence; but that the cooking had not been without effect was shown by the fact that experiments made by feeding animals with portions of raw ham were more uniformly successful than those with the cooked ham. It is to be borne in mind that any bacteria left undestroyed would in time reinfect the whole material, and also that a chemical poison produced by the bacteria would not necessarily be destroyed by a degree of heat sufficient to kill the bacteria themselves. A series of cases of "pork-pie poisoning" at Retford, investigated by Mr. Spear in 1887, which presented similar features to the Welbeck outbreak, was found to be caused by a bacillus developing in the pies after cooking. It was found by Dr. Klein that exposure for one moment to a temperature of 153·5° was sufficient to kill the bacillus; but exposure for twenty minutes to a temperature falling from 143·6° to 136·4° did not do so.

For house disinfection fumigation with sulphurous acid or chlorine gas, the latter preferred, followed by thorough cleansing and scrubbing, removal of wall-paper and lime-washing, are to be recommended; but these processes, to be effectual, need to be carried out with more thoroughness than is frequently done. A difficulty often met with is to know where the inmates are to go while the house is being disinfected; and it would be useful for this and other purposes if sanitary authorities had power to provide refuges for people whom, although not themselves sick, it might be desirable to remove from their homes.

PHYSIOLOGICAL VALUE OF MEAT FOOD FOR INVALIDS, AND WASTE IN METHODS OF PREPARATION.*

BY CHARLES MOORE JESSOP, M.R.C.P., LOND.

Deputy Surgeon-General, Army (retired).

In the preparation of beef-tea it appears to me that there is considerable waste of material, which arises from a desire to give food of high nutritive value in small quantities, irrespective of its component parts combined in natural proportion. This idea has been fostered by an eminent chemist, whose preparation has not the object, as he himself states, of feeding the sick, but unfortunately adopted by the public for that purpose. Nature does one thing, man another; which is the preferable teacher I will endeavour to show.

Forty years ago patients were deluged with meat washings, under the belief they were being nourished; as they did not improve, brandy was adopted, so between brandy and meat washings, their recovery was delayed, under a mistaken idea that there was virtue in scent, salts, and brandy. Pounds of meat were, and still are, wasted in the preparation of beef-tea, whilst brandy is rightly enough tabooed. Medical men know perfectly well what good beef-tea should be, but patients complain that the doctors do not give them easy directions for its preparation. There is some truth in the complaint, for we are apt to forget that what we are familiar with, the laity, including nurses, is unlearned in. We accept the off-hand statement, "We know all about it," without inquiry.

One reason for waste in material is, that the fastidious palates of the sick are catered for whilst their bodily health is unintentionally neglected; this results from ignorance. Nurses, cooks, and patients all clamour for clear beef-tea. Clear beef-tea is of no use to anyone as food. It is true it is "just what the patients like," and what they "can be got to take;" but what is proper for sustenance is lost sight of. However well beef-tea may be made, the most important part is left at the bottom of the cup—"the grounds which are no good." The patient does not progress; the attendants "have done all they can do"—which is just what they have not done by rejecting the "grounds as no good." When patients are sick, mental equilibrium is more or less at fault, and against their will must they be fed. Attendants, therefore, require instruction, and with requisite tact they will apply that knowledge.

I propose to bring together (1) facts relating to the nutritive value of meat and what becomes of it after ingestion; (2) to comment on the literature of the subject as found in various journals; and (3) to consider how waste may be remedied and a saving to public and private institutions effected.

Physiological Value.—Meat consists of 78 parts of water and 22 parts of solids, nearly all albumen or nitrogenous substances, which are easily assimilated, and from which a much more rapid metamorphosis of tissue takes place than from vegetable food. Hence, when meat fibre enters the stomach, the gastric juice converts it into a soluble crystalloid or peptone capable of diffusion through animal membrane. By osmosis it passes through the walls of the capillaries of the

* Read in the Section of Public Medicine at the Annual Meeting of the British Medical Association, held in Leeds, August, 1889.

stomach, whence it is conveyed to the liver by the portal vein before entering the general circulation.

The duty of this nitrogenous substance is to develope and renovate the tissues, assist in the formation of secretions, and produce force. Every substance in the body in which any form of force is manifested is nitrogenous; and as nitrogen where function is performed is traceable hroughout the world, such constancy proves necessity. "Nitrogenous substances composing the textures of the body determine the absorption of oxygen. The absorption of oxygen does not determine the changes in the tissues, but changes in the tissues determine the absorption of oxygen. In other words, without the participation of nitrogenous bodies no oxidation and no manifestation of force is possible."* Hence, if nitrogen be cut off from the body, the various functions languish and the body dwindles. "Gelatin is chiefly destroyed in the blood and glandcells, and its energy therefore has a direction different from that of albumen." It is the least perfect kind of albuminous matter existing in animal bodies, and its nutritive value is one-quarter that of albumen. Submitted to prolonged ebullition, or 220° F., it evolves ammonia, becomes syrupy, loses the property of coagulation, and speedily putrefies. Hence, its nutritive property is destroyed and it impairs digestion.†

From the albuminates fat arises, so that the nitrogenous substance plays two parts; first, of the organic framework, that is, the regulation of oxidation and of the transformation of force; and, secondly, it forms a non-nitrogenous substance, which is oxidized and transformed. Fat stored up in fattened pigs cannot be derived from the fat given in the food, but must have been produced partly from nitrogenous substances, but chiefly from the carbo-hydrates. So also it seems now probable that the fat in milk is not derived at once from blood, but from changes of albumen in the lacteal gland cells.*

The digestive system of man is so formed that fat either cannot be formed in sufficient quantities from albuminates or the body is poisoned by the excess of nitrogen which is necessarily absorbed to supply it, so that fat must be taken in addition. Excess of albuminates causes a more rapid oxidation of fat, while excess of fat lessens absorption of oxygen and hinders the metamorphosis of both fat and albuminous tissues.*

Chossat laid down as a broad principle, derived from experiments on many different creatures, that life ceases when an animal loses two-fifths of its weight, so that an animal weighing 100 pounds would die when its weight was reduced to 60 pounds. The daily loss amounts to one twenty-fourth part of its entire weight —a statement in harmony with the conclusions of Bidder and Schmidt that an animal to maintain its weight ought to take one twenty-third part of its weight daily in the shape of food susceptible of being assimiated, water of course included.‡

1. An adult European, in moderate work and 150 pounds in weight, requires 22·866 ounces of water-free food, that is, 0·15 ounce for each pound weight, with which is mixed from 50 to 60 per cent. of water, or a total of about 40 ounces of ordinary food—about 305 grains of nitrogen. In addition a total water supply of from 70 to 90 ounces, or an average of 0·5 ounce per pound weight. 2. In rest the amount is about 16 ounces water-free food, equal to 240 grains of nitrogen, and is sufficient. 3. The smallest amount of nitrogen necessary for the inner movements of the body and bare maintenance of life is 138 grains, or 2 ounces.† This may be considered to be the sick man's state.

The quantity of urea passed in twenty-four hours is said to be the measure of the ingestion of nitrogen, but this view seems somewhat defective, because in fasting or with non-nitrogenous diet urea is still secreted. The nitrogenous diet, therefore, cannot be its sole source. Hence the determination of the quantity of nitrogen to sustain life, or keep up the inner movements of the body of an adult, does not depend upon the amount passed as urea, since urea does not depend upon nitrogenous food for its sole production. The human body may be likened to a closed vessel full of liquid with escape valves; extra liquid added will escape by the valves and be a measure of the liquid added, but the drops which escape are not the drops that were added, for the overflow depends on the inability of the vessel to hold more than it can contain. So when extra nitrogenous diet is indulged in, this determines the passage out of the body of matters which have performed their functions, at a rate proportionate to the activity induced by fresh material, and is a measure of the mechanical energy throughout the body, but is not an index of what is required to sustain life.

A cubic millimetre of blood contains about five millions of blood corpuscles, each one of which Dr. Hunter considers to have a life-duration of probably three weeks. Many millions of corpuscles are doomed at every round of the circulation to destruction and conversion into urea and the like. This destruction, says Dr. Paton, must be considered a powerful stimulant to the secretion of bile, the liver having as one of its functions the elimination of effete hæmoglobulin. By this same process urea also is increased. Hence, urea formed even in starvation continues to be secreted till there are no corpuscles left to secure the office of respiration, and go the round of the circulation. But when fresh albumen enters the portal circulation, the blood pressure is raised and products, ready formed for use in the direction assigned them, are passed on

For the state of rest in heath 240 grains of nitrogen are said to be sufficient; but a bed-stricken patient, whose muscular and mental efforts are reduced to a minimum, whose vital processes are carried on with much less energy than usual, and who loses comparatively little heat, requires a relatively small supply of food; and as at least 138 grains must be supplied, this supply should be thoroughly wholesome, easily digested, and consist of nutritive material.* Animal food especially rich in nitrogenous elements digests in proportion to the minuteness of division and tenderness of fibre sooner than farinaceous, so that it is better adapted for those who are only able to take small quantities at one time.

Meat peptonized by the gastric juice is absorbed by the vessels of the stomach; the blood in those vessels charged with constituents whose period of service in the economy has expired is on its way to the liver to be transformed into bile and urea. Arrived at the interlobular veins, it traverses the acini by fine capillaries which enter the intra-lobular veins for conveyance to the right auricle. This work constantly going in is like the daily routine work in a manufactory in which, when new material is brought, there is increased energy in all departments: and the process is comparable with iron ore entered at the mouth of a smelting furnace, passed through several ovens, and which appears at the orifice of exit converted into steel; no one sees the conversion, but the highly-finished product is far different from that of the raw material.

Literature of the Subject.—Extractum carnis, Dr. Beneké states,† is made by chopping 1 pound of beef finely and mixing it with its weight of cold water slowly heated to boiling, then briskly boiled for a minute or two and strained. Six pounds of meat thus treated yield, after evaporation on a water-bath, 3 ounces. Hence 1 ounce of this extract equals 32 ounces of meat.

* Parkes.
† Power.
‡ Guy.

* Power.
Lancet, 1851.

Dr. Hassall* exposes the fallacy of this supposed nutritive value, since fibrin, gelatin, albumen and fat are absent, and that what remains consists of excrementitious substances and blood-salts.

Baron Liebig himself says that neither tea nor extract of meat is nutriment in the ordinary sense. "It will be well understood, therefore, that by the addition of extract of meat to our food we neither economize carbon for the maintenance of the temperature nor nitrogen for the sustenance of the organs of the body, and that, therefore, it cannot be called food in the ordinary sense."†

Dogs fed exclusively on extractum carnis die sooner than those not fed at all, which seems to be due to the deleterious influence of the potash salts contained in the extract, for though these are indispensable in the economy, yet a larger dose of them is injurious in the absence of food whose metabolism it is their office to direct.‡

A patient may be swallowing several ounces of extract daily, and yet be actually starving; he may feel better for it, but his strength will not return unless he can swallow something else as well. We have eaten half a pot of the stuff, and remained as hungry as ever, the only effect being to produce thirst, to heighten the bodily temperature, and to increase the nitrogenous waste in the urine.§

Extracts of flesh, fish and crab are prepared, and have been used for several centuries, and probably longer, says a writer in the *Medical Times and Gazette* for October, 1870, in different countries. In the Malay Archipelago certain meats, sea fish, and little marine crabs the size of a pea are reduced to extracts, and used extensively as flavours and to strengthen with these extracts celebrated native dishes.

These extracts, then, are good stimulants, and useful to bring up the flavour of poor soup, but have no nutritive value, and require as great, if not greater, caution in administration to the sick than wine or brandy.

Meat extracts are neither direct aliments, for they contain no albuminous matter, nor indirect aliments, for their azotised principles do not arrest disassimilation.‖ In small doses they may be useful from the stimulant action of the potash salts, which aid digestion and circulation. In larger doses they have an injurious effect. In prolonged illnesses, when the powers of life are enfeebled, the salts of potash may, in place of favouring nutrition, impede it (1) by direct action upon the blood globules, causing a diminished absorption of oxygen; (2) by the predominance of salts in the serum, which exert no special solvent action on carbonic acid, and do not permit the exhalation of the normal quantity of this gas, and consequently the introduction of oxygen. To give these extracts alone is to keep the patient in a state of inanition.‖

A piece of beef, 1 or 2 drachms in weight, ground to a very fine pulp, is placed in a cup with two tablespoonfuls of water, with a pinch of salt; this can be warmed by the fire in ten minutes. The whole (grounds and fluid) is to be swallowed every four hours. Given in this way it is regarded as a medicine, and will be taken when, as beef-tea, it would be rejected. This process is only intended for cases of emergency, and when delay would be injurious.†

Dr. Leared describes a digester; in this he places 1 pound of beef finely minced, with 4 ounces of water, or preferably 8 ounces, from which he produces 9 or 13 ounces.¶ He does not say how he disposed of the remainder.

In the *Gazette Médicale*, 2 pounds of beef are directed to be taken, chopped up and placed in a litre of water with a small quantity of hydrochloric acid; this is to be boiled for fifteen hours, then strained, the mass crushed, emulsified, and boiled again for fifteen hours. The whole is then neutralized with bicarbonate of soda, and evaporated to the consistence of pap.*

Dr. Leared macerated 1 pound of crushed muscle for three-quarters of an hour with a pint of cold water, boiled for two hours, and strained.

In the journal for 1880 is described a complicated process, the last of the various methods described in the journal. Except the French method, which is peptonized beef-tea, only one aims at presenting to the stomach meat fibre in its natural condition, small in bulk and of physiological value when swallowed; the rest are highly scented and highly salted specimens of broth of little nutrient value, and extravagant waste in production.

Waste of Meat.—Private individuals and public institutions have various ways of making beef-tea, some boiling for long periods and others adding "stock," and equally varied ways of disposing of the remainder when they have, as they term it, "extracted all the goodness out of the meat," which means they have wasted half or two-thirds of the quantity of meat employed, and double salted what they have retained; the effect of which concoction is to produce thirst, heighten the bodily temperature, and increase nitrogenous waste; these results arise from the salts being out of proportion to the albuminates. The half or two-thirds of discarded fibre, termed refuse, is by some sold with "hogs" wash. In one institution alone I know that over 20 pounds were thus daily thrown away; others charitably (?) give it away. If the goodness has been extracted, where is the charity? Surely actions belie words. Each thus satisfies the conscience that subscribers' or ratepayers' money is not wasted. Private individuals throw the remainder into the ash-pit. There are others, however, in both classes who, more thrifty, use the remainder in soup or other ways.

In the Metropolitan area—not counting cottage hospitals, private and public asylums, poor-law infirmaries, numbering 28, workhouse infirm wards and military hospitals—there are no fewer than 87 establishments, including Bethlem, with 11,100 beds, which necessarily use fluid meat food more or less. On the supposition that 2,220, or one-fifth of the whole number, may require fluid food, and allowing 12 ounces of meat to each pint, in the course of one week 5·2 tons of solid meat would be required for this purpose alone. I venture to think that this amount is two-thirds in excess of what is necessary to be used. The cost of this quantity will depend upon the quality of beef used; and for the larger establishments, where 100 or more pints are used daily, this is a subject for inquiry, since not only is there waste of food, yearly loss of revenue, no benefit to the sick, but habits of extravagance fostered amongst a class of persons who, of all people, should practice economy.

Of course, the present system is continued on the plea of succouring the sick person with "the best beef-tea that can be made," whilst his starving brother lies outside vainly wishing for what the pigs are fed upon. But admitting that the present method is continued—as I am sure it is—from honest conviction that it is the best, may it not be worth while to inquire if it cannot be improved by putting on one side preconceived notions, and the dull round of routine, and adopting a method which does not countenance waste, does not injure or defraud the sick, and reduces the butcher's bill?

If albuminates are essential to health, and animal food digests in proportion to the minuteness of its division, how much meat-fibre can be suspended in a

* *Lancet*, 1865.
† *Lancet*, 1869.
‡ *Medical Times and Gazette*.
§ Editor of *Medical Times and Gazette*, 1871.
‖ M. Muller in *Medical Times and Gazette*, 1872.
¶ *Lancet*, 1874.

* *Lancet*, 1873.

given quantity of water to make such a draught of nutriment agreeable in swallowing? After many trials I find that 4 ounces of meat can be suspended in 1 pint (20 ounces) of water, and can be taken without disgust, that is, "grounds" do not collect on the pallate nor remain in the gullet to annoy the patient; and that from 2 to 4 ounces of such fluid given every three or four hours is sufficient for any sick man. So that if a patient receives a pint and a half of such food in twenty-four hours he gets a very large supply of nitrogenous food, and enough for a healthy man in a state of rest. If the food is made stronger than this proportion a very sick man will refuse it, and this is the very difficulty which will be overcome by a good nurse.

One ounce of the best meat contains 14·22 grains of nitrogen; 6 ounces will contain 85·32 grains, and, as 138 grains of nitrogen are supposed to be required the remainder has to be made up from eggs, flour, and other matters. But the question has frequently arisen in my mind, whether a sick man does really require so much nitrogen daily. Theoretically he may, but practically he does not, nor does he get it. On many occasions I have witnessed very remarkable results from much smaller quantities of meat food—very far below the physiological quantity—so that I cannot help thinking there is some fallacy in the quantity of nitrogen required to keep up the inner movements of the body, particularly if urea, as hitherto maintained, is not the measure of nitrogen required, but in part the measure of the disintegration of blood corpuscles.

In making fluid meat food there should be neither refuse nor remainder. Say 100 pints is required: 25 pounds of good beef well chopped up or minced is placed in a digester with 100 pints of water and boiled for three hours, being frequently stirred and rubbed about with a wooden masher. At the end of this time the fibre is cooked; it should then be passed through a colander to ensure evenness of size and that no fibres adhere. If the process is properly managed there will be no remainder. If required, it can then be seasoned with a little salt, onions, and so forth. The better the quality of meat the less gelatine and better flavour. Prolonged ebullition has not destroyed whatever nutritious properties the gelatin may possess. The food of nature is thus simply cooked and suspended in a given quantity of water. The addition of stuff called "stock" is not required, for, besides being injurious, owing to prolonged ebullition, it gives a disagreeable flavour. The salts are in proportion to the albumen; the draught is thoroughly wholesome, and if administered not more frequently than every three or four hours the stomach will have suitable intervals of rest.

If rectal alimentation has to be employed only half or one-third of water need be used, or even less, so long as the fluid food can be passed through the tube.

For workhouse infirm wards the cut up "shin of beef" can be placed upon a strainer of nine meshes to the inch within an ordinary meat boiler, and by frequent stirring the disintegration fibres will drop through. In one institution this process answers its purpose admirably, and gives the cook no trouble.

Last year Dr. Laffan obtained from Sir C. Cameron an analysis of the old and new processes as follows:—

	New process.	Old process.
Water	94·65	98·45
Albuminates, crystalline bodies, kreatin, etc. . .	4·25	0·90
Fats	0·20	0·07
Salts	0·90	0·55

The fluid from the new process was thick; in the old clear.

I confess I was not prepared to find my notion of an increase of salts in the old process so at fault, but the increase in the new process is more than compensated by the increase in the albuminates, while disproportionate in the old.

For travellers and urgent use at any time water-free beef, pounded and sealed hermetically in small tins, would be very advantageous; but all fluid extracts are disappointing and expensive. Poor folks require food within their means, and for such the above method is advantageous, let alone the saving to public institutions.

PROTEID POISONS, WITH SPECIAL REFERENCE TO THAT OF THE JEQUIRITY (ABRUS PRECATORIUS).*

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It is only within the last thirty years that the fact has been established that a proteid, when introduced into the circulation of the blood, is poisonous. This fact, remarkable as it is in itself, becomes of greater significance when it is considered that these poisonous proteids are not distinguishable by any well-marked chemical reactions from the non-poisonous proteids, and that proteids are not only essential as food to animals, but also have an important nutritive relation to protoplasmic cell-life both in the animal and vegetable kingdoms. During the last two years I have been engaged, as British Medical Association Research Scholar, in the investigation of the properties and action of certain of these proteid poisons. Those that have specially occupied my attention are the jequirity (*Abrus precatorius*), the papaw juice (papain), and the animal albumoses and peptones.

The list of the proteid poisons is extending more and more, and may be subdivided into two groups—those found in animals and those found in plants.

Animal Proteid Poisons.—1. First and foremost stands the *venom of snakes*, both colubrine and viperine; 2. The *serum of the eel*—the conger eel and the muræna; 3. Poisons formed during natural digestion in the stomach and small intestines—*albumoses and peptones*; 4. Proteid poisons found in certain spiders. To these may be added the body which produces coagulation of the blood *intra vitam* (Wooldridge).

The Vegetable Proteid Poisons.—5. Jequirity (*Abrus precatorius*); 6. Papain (*Carica papaya*); 7. Lupinotoxin (?) (*Lupinus luteus*).

The Poison of Jequirity (*Abrus precatorius*).—The seeds of jequirity contain a substance which, as is well known, when extracted, as in a watery infusion, produces a local irritation and inflammation of the conjunctiva, which has been utilized in practical medicine for the cure of granular lids and of pannus. Its employment in these conditions has not, however, been found to be so beneficial as at one time was thought probable, so that at the present time jequirity may be said to possess chiefly a scientific interest—one, as I shall indicate, of possibly great significance. Investigations into the exact nature of the poison have not been wanting, and the knowledge obtained from them has gone through many curious phases.

From the researches of Sattler, Cornil, and Berlioz, it was concluded that the irritant action of jequirity was due to a special bacillus which grew in the infusion of the seeds, and was called the jequirity bacillus. Contrary, however, to the behaviour of liquids containing specific bacteria, the physiological activity of the infusion of abrus seed was totally destroyed by heating it to the boiling point of water (Klein); and, following this result, Warden and Waddell† separated

* From a report presented to the Scientific Grants Committee of the British Medical Association, *Brit. Med. Journal*, July 27.

† 'The Non-Bacillar Nature of Abrus Poison,' Calcutta, 1884.

from the seed a body they called "abrin," which was a proteid body, and which possessed the physiological properties of jequirity. Furthermore, although these observers found bacteria in the local lesions produced by jequirity, these organisms were of various kinds, and, after cultivation and separation, were found to have none of the poisonous properties of jequirity. To dispose at once of this idea of the bacterial nature of jequirity poison, I may say that in my experiments, using a pure product, I have found no bacteria present in the local lesions, either in those produced at the seat of injection or in those produced internally in the peritoneum or alimentary canal. The sections were stained by Gram's method.

We must look, therefore, to the proteid or proteids present in the seed for the poison of jequirity. Warden and Waddell's "abrin," as described by them, did not possess very definite characteristics; it was called a vegetable "albumin," but evidently did not belong to this class, as it was precipitated by acetic acid. In 1886, I separated and examined the proteids present in the seeds, and obtained the following results*—both of the proteids separated possessing poisonous properties.

Nature of Jequirity Poison.—The seeds contain two proteids—a globulin and an albumose. The globulin is soluble in 15 per cent. sodium chloride solution, and coagulates by heat between 75° and 80° C. Like other members of its class, it is precipitated from solution by saturation with sodium chloride and magnesium sulphate. It belongs to what I have described elsewhere as the vegetable paraglobulins.† The albumose is soluble in water, is not precipitated by boiling, but is thrown down by nitric acid, the precipitate being soluble on heating the solution, and coming down again on subsequent cooling, this being the characteristic reaction of the albumose class. This body also gives the "peptone" reaction, namely, a pink coloration with copper sulphate and caustic potash.

For the investigation of the physiological action of these two proteids, the mode of separation from the seed is important, because, as I shall discuss subsequently, it is a question whether these proteids are of themselves poisonous, or produce their toxic effects by having a non-proteid body, as it were, tacked on to them—in fact a body, possibly alkaloidal in nature, not completely separated from the proteid in the preparation of the pure poison.

The globulin is separated by extracting the crushed and decorticated seed with 15 per cent. sodium chloride solution, and precipitating the clear filtrate by saturation with solid sodium chloride after acidulating with acetic acid. The precipitate of globulin with part of the albumose is mixed with distilled water, and dialysed in running water for several days. The globulin is in great part thrown down in the dialyser, while the albumose remains in solution. The globulin is now removed by filtration, and washed with distilled water (previously boiled to sterilise it) for two days, in order to remove any albumose or sodium chloride clinging to the precipitate, the absence of the albumose being tested by the washings giving no reactions for a soluble proteid, and the absence of the salt by a negative reaction with silver nitrate. The globulin is then removed from the filter and dried over sulphuric acid. Prepared in this way, it is a whitish-yellow, amorphous powder, soluble for the most part in 15 per cent. sodium chloride, and giving the reactions previously described. In the dried state, it may be kept for a long time without losing its physiological properties. Specimens prepared for more than fifteen months are as active now as when first dried. This fact is, indeed, only in accordance with the behaviour of other dried proteids; they can be kept an indefinite time in the dried state without undergoing any chemical change.

* *Proc. Roy. Soc.*, vol. 42, p. 331.
† *Proc. Physiolog. Soc.*, 1887.

The albumose was prepared by making a concentrated watery extract of the seeds, and filtering the clear infusion direct into an excess of absolute alcohol, thus throwing down both proteids as a white precipitate. After a few days the precipitate was removed, redissolved in water, and reprecipitated by alcohol, this process being repeated at intervals of a few months. The precipitate was allowed to stand under alcohol for about eight months or longer, at the end of which time the globulin was completely coagulated, while the albumose was still soluble in water. Dried over sulphuric acid, the residue was a yellowish-brown, amorphous powder, consisting of coagulated globulin and unaltered albumose.

*Physiological Action of the Proteids of Jequirity.**—For subcutaneous injection and for instilling into the eye a solution of the proteids was made. The globulin was dissolved in 15 per cent. sodium chloride solution, and the albumose in distilled water or normal saline solution (0·75 per cent. NaCl). Previous to using these liquids or solvents, they were well boiled to sterilise them, and then cooled. A weighed quantity of the proteid was then dissolved and used in the experiment; or a solution of the proteid was made, and the quantity present was estimated.

Local Action on the Eye.—A watery infusion of the seeds when instilled into the eye produces, as is well known, severe inflammation with purulent discharge; and it is this action which is both beneficial in the treatment of granular lids and of pannus. Both the globulin and the albumose of jequirity possess this property. Thus in one experiment 2 milligrams of the solid globulin (containing some coagulated proteid) were placed on the inner surface of the left eyelid of a large rabbit. In seventeen hours and three-quarters the conjunctiva was reddened and slightly swollen; there was no chemosis, but there was a clear serous discharge. In twenty-four hours, there was intense purulent ophthalmia, with subconjunctival ecchymosis: the cornea being quite clear. The purulent discharge lasted till the death of the animal, eighty-three hours after inoculation; the animal being apparently ill for about four hours before death. At the *post mortem*, there was severe subconjunctival hæmorrhage, with œdema round the eyeball. If the dose be smaller, the animal does not die after eye inoculation, nor does it suffer from any general symptoms; but local inflammation and œdema with purulent discharge always follow in about sixteen or seventeen hours.

One milligram of the albumose dissolved in two minims of sterilised distilled water, when placed on the eye of a rabbit, produced in less than twenty-four hours severe conjunctivitis with chemosis, and left at the end of six days a steamy cornea with leucomata and subconjunctival ecchymosis. The animal showed no symptoms of poisoning. Both globulin and albumose therefore possess this property of producing severe conjunctivitis.

General Action on the Body.—The symptoms produced by the subcutaneous injections of the proteids of jequirity are those which have been described by Drs. Warden and Waddell. The action of the globulin is not, however, quite identical with that of the albumose. In the first place, the globulin is more poisonous than the albumose. In rats, for example, 10 milligrams of globulin per kilo of body-weight is a fatal dose, and in the same animals 60 milligrams of albumose per kilo of body-weight.

If the above mentioned dose of globulin be injected into a rat, symptoms of poisoning begin to appear in about six hours; the animal then seems a little languid,

* The action of the globulin was investigated in co-operation with Dr. Wolfenden; for the account of the albumose I alone am responsible. The results are published in two papers in *Proc. Roy. Soc.*, May, 1889.

and in a condition impossible to distinguish from sleepiness. It continues in this state, making no voluntary movement, irresponsive to slight external stimuli, and with half shut eyes. It lies huddled up in its cage, the breathing becomes more rapid, and bloody motions are passed shortly before death, which occurs in about twenty-four hours after inoculation. If the animal is with young, it aborts. *Post mortem*, there are signs of œdema and punctiform ecchymosis at the seat of injection, and punctiform ecchymosis also beneath the peritoneum, and sometimes in the lungs. The intestines are congested, and sometimes greatly inflamed; the adenoid patches in the mucous membrane are swollen, and submucous ecchymoses are often seen. The blood sometimes remains fluid for a long time, and is sometimes coagulated. The symptoms of poisoning by the albumose and the *post-mortem* signs are similar to those described as produced by the globulin.

It may be pointed out that there are no symptoms referable to definite lesions of the organs, except the occurrence of bloody motions due to gastro-enteritis. The sleepiness in gradually increasing coma may be explained by an effect on the cerebrum; as there is not sufficient dilatation of the vessels of the abdominal organs to explain the occurrence of coma by drainage into the "splanchnic area," the occurrence of rapid breathing, which is produced chiefly by the globulin, may be explained by an affection of the respiratory centre. The only early symptom of abrus poisoning is a fall of body temperature, and this is produced both by the globulin and the albumose.

This lowering effect of the jequirity proteids on body temperature was noticed in cats by Warden and Waddell. It is important, when taken in consideration with the fact that rattlesnake venom produces a similar effect (Weir-Mitchell and Reichert), and that, on the other hand, animal albumoses and peptones have been shown by Ott and Colmar* to produce fever in mammals.

Effect of Heat on the Activity of Jequirity Proteids.—Boiling the liquid destroys the activity of the infusion of jequirity seeds. This, as has been mentioned, is an argument against the bacterial nature of the poison. It was desirable to test, however, with exactness at what temperature this activity was permanently destroyed. For this purpose solutions of the globulin and albumose were momentarily heated up to 50°, 60°, 75°, 80°, 85° C. before being used for inoculation. In each separate series of experiments an unheated solution of proteid was also inoculated, in order to have a control, and a lethal dose was always used. For the details of these experiments the papers in the *Proceedings of the Royal Society*, already quoted, must be referred to. Suffice it to say here that the results obtained were—(1) that the activity of the globulin was permanently destroyed by momentarily heating its solution to between 75° and 80° C., that is, about its coagulation temperature, while the solution of albumose had to be heated up to 85° C. before the activity of the proteid was destroyed; (2) that momentary heating of the solution to above 50°C. but below 75° in the case of the globulin, and 85° in the case of the albumose, weakened the activity of the proteid without destroying it.

The conclusions therefore arrived at regarding the jequirity poison may be thus summarised:—

1. The toxic action of the jequirity (*Abrus precatorius*) resides in two proteids—a globulin and an albumose.

2. Both these proteids produce nearly the same effects, namely, local œdema and ecchymosis at the seat of inoculation, with ecchymosis in the serous membranes, and gastro-enteritis, the blood in many cases remaining fluid. The general symptoms are a gradual sleepiness, ending in coma, with rapid onset of rigor mortis.

3. That both portions have a remarkable lowering effect on the body temperature; the globulin, at the same time, producing rapidity of breathing, while the albumose does not have this effect to the same degree.

4. That the activity of both proteids is destroyed by a temperature below the boiling point of water; the globulin between 75° and 80° C. and the albumose at 85° C., while temperatures below these points but above 50° C. diminish the poisonous activity.

Relation of the Abrus Poison to Snake Venom.—It is chiefly due to the researches of Weir-Mitchell that the poisonous principles of snake venom have been shown to be of an albuminoid nature. In the latest publication on the subject Weir-Mitchell and Reichert* affirm as the result of their analyses and experiments that the poisonous proteids present are of two kinds—a globulin and a peptone, or peptone-like body; that all kinds of venom contain these two bodies, although in varying proportions, speaking generally, the globulin being greater in proportion to the "peptone" in viperine snakes (such as the rattlesnake), and the peptone being in greater proportion in the venom of colubrine snakes, such as the cobra; that both the globulin and peptone of the venom are poisonous, producing practically the same general symptoms, but with this exception (and a noticeable one it is), that the great local ecchymosis and inflammation of snake-bite is due to the globulin present in the venom and not to the "peptone."

For reasons which I have detailed elsewhere,† it seems to me that Weir-Mitchell and Reichert's venom "peptone" is not a true peptone, but belongs to the albumose class of proteid bodies. The relation of abrus poison to snake venom is now apparent. Abrus seed contains two poisonous proteids—a globulin and an albumose—which both produce local œdema and ecchymosis. Rattlesnake venom also contains a globulin and a peptone-like body (probably an albumose), the former of which produces local ecchymosis and inflammation. The resemblance is further strengthened by the fact that heat diminishes the activity of both abrus poison and of snake venom; but in this respect abrus poison seems to be more sensitive than venom. Thus, even after boiling and filtering, rattlesnake venom, if given in sufficient dose, is fatal; and cobra venom is still active (although permanently destroyed by boiling for half an hour), while, with abrus proteids, a momentary heating of the globulin in a solution up to 80° C., is sufficient to destroy its activity, while with the albumose the destroying temperature is 85° C. Rattlesnake venom, like abrus poison, also lessens the body temperature. The great difference, however, between snake venom and abrus poison rests in the fact that venom produces local paralysis and general convulsions while abrus has no such effect. Abrus seems to affect the cerebral hemispheres, producing stupor, ending in coma.

It is evident, therefore, that while abrus poison bears some resemblance to snake venom it is far from being identical with it.

Nature of Abrus Poison.—At present it is not explicable why proteids should be poisonous; why, when injected subcutaneously or into the venous system, they should cause death. And so anomalous does the toxic power of these bodies seem that we are bound to consider whether a proteid is of itself poisonous or possesses toxic properties by virtue of some agent or body tacked on to it or formed from it. Such an agent associated with a proteid would be called a "ferment." We know that the ferments used in digestion are normally associated with proteids, although Cohnheim claimed that he had separated ptyalin from all associated proteid, and Brücke stated the same of pepsin; and

* *Journal of Physiology*, vol. viii., p. 218.

* 'Researches upon the Venom of Poisonous Serpents.' Philadelphia, 1885.

† *Proc. Roy. Soc.*, May, 1889.

even granting that these two ferments may be separated from their associated proteids the fact remains that ferments are in nature closely linked with albuminoid bodies. What characteristics of unorganized ferments, we may fairly ask, are present in abrus poisons which would lead to the supposition that what might be called a "toxic" ferment is present? The unorganized ferments known alter the constitution of the bodies on which they act, the digestive ferments acting on proteids, amyloids, and fats, while other ferments, such as the fibrine ferment and the curdling ferments, cause the proteids on which they act to assume a solid form. All these ferments have certain characteristics common to all; their action is increased by a moderate heat and permanently destroyed by boiling their solutions; and their activity is not apparently diminished after they have produced their effect.

From this it will be seen that the fact which would point to abrus poison being a "toxic" ferment is the fact that its activity is permanently destroyed by a moist heat below 100° C. Farther than this we cannot at present go. Abrus globulin and albumose possess neither a proteolytic nor amylolytic action, whatever the reaction of the digestive mixture may be. The fact that the activity of the globulin is destroyed at about its coagulation temperature would seem to point to an alteration in the constitution of the proteid as the cause of the loss of poisonous activity; but this again is the temperature at which ferments are destroyed. No evident effect, chemical or physical, is noticed if the albumose be heated up to 85° C. or even boiled, yet its toxic activity is at once and for ever destroyed. This may point to a ferment associated with the albumose; but until we know the chemical constitution of the proteid molecule we cannot assert that this degree of heat does not so alter the construction as to prevent the development of the toxic action. In this uncertain condition the matter must at present rest. It may be considered that the toxic action is not due to the proteid nor to a ferment attached to it, but to some chemical toxic body carried down with the proteid in its preparation. The effect of heat on the toxic activity of abrus would seem at once to dispose of this view. Toxic bodies, such as ptomaines and leucomaines, formed from proteids, are not so sensitive to heat as the abrus poison; and if the details of the preparation of abrus globulin and albumose be referred to it will be seen that the prolonged dialysis in running water and the long extraction of the albumose by alcohol preclude the presence of any crystalline product in the residue obtained.

Parliamentary and Law Proceedings.

Sale of Defective Spirit of Nitrous Ether.

The adjourned hearing of a summons against Mr. William Hardcastle, of Stockton, chemist, for selling adulterated spirit of nitrous ether came before the Stockton Borough Bench on Monday. At the hearing a fortnight ago Mr. J. H. E. Hunton, who defended, asked that the case might be postponed to allow of the sample in question being submitted to Somerset House.

In his certificate, Mr. Stock, the county analyst, certified that the sample was not a sample of genuine spirit of nitrous ether. The certificate from Somerset House stated that the sample analysed was deficient in nitrous ether to the extent of not less than 60 per cent. of the quantity which ought to be present, even after it had been kept some time, and the vessel containing it had occasionally been opened.

The Bench decided that the case had been duly proved, although they exonerated defendant from any intention to defraud. They accordingly fined him 2*s.* 6*d.*, and costs £2 3*s.* 6*d.*—*Leeds Mercury*.

The Supply of Strychnine Vermin Killers.

An inquest was held on Monday last at Newport, Isle of Wight, respecting the death of Frances Hind.

It appeared, that the deceased had sent her daughter, aged eleven years, to a chemist's in the town for threepennyworth of rat poison, warning her not to tell her father. The poison was obtained, and upon receiving it deceased went up stairs, where she was afterwards found dead. The packet of poison was stated to have contained 1½ grain of strychnine.

The jury returned a verdict of suicide while of unsound mind and requested the coroner to censure the chemist's manager for supplying the poison to a child.

Correspondence.

Notes on Chloralamide.

Sir,—As this synthetical product seems destined to obtain a place in pharmacy as a hypnotic, the following notes, in addition to those in the *Pharmaceutical Journal* of the 31st ult., may be of interest:—

The solubility is stated to be 1 in 9 of water. I have failed to dissolve 20 grains in 240 fluid grains of water, the actual solubility being about 1 in 14.

On heating in a dry test-tube it melts, and gives a strong smell of chloral, which condenses on the sides of the tube; and on further heating, chars, and gives a peculiar smell recalling HCN and onions. Heated with solution of potash, it gives off a smell of chloroform and ammonia. H_2SO_4, HNO_3, HCl and Fe_2Cl_6 respectively have no apparent action in the cold.

On adding a few grains to a mixture of ʒss of strong sulphuric acid and 4 drops of 90 per cent. carbolic acid, and warming, the mixture boils almost immediately, and quickly changes to a bright red colour, with a strong chloral odour. This test will distinguish it from most of the new synthetical products, if applied as above, the reactions being shown by the following table:—

Antipyrin.	Antifebrin.	Chloralamide	Phenacetin.	Sulphonal.
No effect.	No effect.	Bright red colour with chloral odour.	Dark purplish-brown, with strong acetous odour.	Bright emerald green, immediately changing to dark, dirty green with strong sulphurous odour.

Chloralamide does not reduce Fehling's solution or decolorize Pavy's.

It occurred to me, on reading the next paragraph in the issue quoted above, viz., "Physiological Action of Disulphones," that if the hypnotic effects were proportional to the increase in number of the ethyl groups, would not the introduction of an ethyl group into chloralamid also enhance its hypnotic properties.

3, *Hanover Street, W.* R. Casswell Harrison.

A. Pumphrey.—A paste made by mixing together one drachm each of black wool dye and methylated spirit, 10 drops of acetic acid, 5 drachms of water and 2 drachms of glycerine has been recommended as a black ink for rubber stamps.

J. H. Smith.—(1) We do not think the substance is suited for making a good ink. (2) Crocus of antimony is a compound made by deflagrating together equal parts of black sulphide of antimony, a small quantity at a time, and reducing the fuse to powder. (3) See previous answer. (4) A black hectograph ink may be made by dissolving 25 parts of nigrosine in 95 parts of boiling water and when cold adding 5 parts of acetic acid. Or a violet ink may be made by dissolving 1 part of aniline violet in 5 parts of methylated spirit and 3 parts of water.

Battonian.—Diphenylamine: see a paper by N. H. Martin in *Pharm. Journ.*, [3], viii., 229.

Communications, Letters, etc., have been received from Messrs. Umney, Ekin, Holmes, Fox, Thomas, Wall, Gostling, Butler, Martin, Hurd, Spero.

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 14, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE BRITISH PHARMACEUTICAL CONFERENCE AT NEWCASTLE.

THE visit of the British Pharmaceutical Conference to its birthplace is over and past, but it will be long before the memories of so successful and pleasant a gathering will die out. Unfortunately for amateur prophecies as to the decadence of the Association, they received very little confirmation in the incidents of the meeting, for the attendance was large and representative, whilst the papers read were unprecedentedly numerous and eminently practical. The happy commencement of the proceedings, at the numerously attended Reception by the President of the Conference and his colleagues in the Durham University College of Science, where Music and Science each appealed to its votaries, augured well for success, and when on Tuesday morning the Principal of the College, Professor GARNETT, rose to utter a few happily chosen words of welcome from the authorities of the College, the fine Physics Lecture Theatre was well filled with ladies and gentlemen. Mr. N. H. MARTIN followed with a welcome from the pharmacists of the North of England, in which he ingeniously called attention to the presence of the "fathers of the Conference," in Messrs. SCHACHT, REYNOLDS and BRADY. A list of delegates appointed to attend the meeting by various associations was then read and the more serious business of the Conference began.

Report of the Executive.

The President first called upon Mr. W. A. H. NAYLOR, one of the Honorary Secretaries, to read the Report of the Executive Committee. This commenced with the satisfactory announcements that the numerical strength—which, however, was not stated—had been more than maintained, and that signs of increased activity were not wanting. Beyond the fact, however, that a somewhat larger number of papers were to be read at the meeting, the latter statement was scarcely borne out by the succeeding paragraphs, which were, indeed, chiefly negative in character. The biennial "whip" for new members had hardly been so successful as had been hoped, and an appeal was made to supplement it by personal influence. Regret was expressed that no application had been made during the year for a grant in aid of research, and it may be added that the papers subsequently read did not include any report on the subject of a previous grant. In addition, the Chairman of the Unofficial Formulary Committee had reported that the work in hand had not reached a sufficiently advanced stage to justify a recommendation for any fresh publication. The other items in the report were a reference to the recent revision of the "blue list," a statement as to a new local secretary for Canada, a complimentary allusion to the imminent departure of Mr. PLOWMAN, late senior Honorary Secretary to the Conference, to take up an appointment in the Melbourne College of Pharmacy, and an appropriate recognition of the loss the Conference had sustained in the death of Mr. JOHN WILLIAMS.

Financial Statement.

The Financial Statement was then read by the Honorary Treasurer, and proved satisfactory in so far that it showed that in the past year, unlike the two or three previous ones, the income of the Conference had been sufficient to cover the expenditure. This improvement was not consequent upon any very large increase in the amount received for subscriptions—£583 10*s.* 4*d.* against £534 13*s.* 6*d.* in 1887-88—since the amount was still below that received in 1886-87. As will be seen it was principally due to a decrease of upwards of £100 in the cost of the last Year-Book. Taking away the disturbing elements of outstanding liabilities and assets the cash income for the year appears to have been £698 9*s.* 7*d.*, and the expenditure £642 2*s.* 7*d.*, being an excess of income amounting to £56 7*s.* 0*d.* This has enabled the Treasurer to reduce the liabilities, which stood in the last financial statement at £138 17*s.* 10*d.*, to the sum of £6 17*s.* 9*d.*, against which the Conference possesses assets amounting to £185 7*s.* 7*d.*, in addition to the value of the stocks of Year-Books and Formularies. The Report and Financial Statement were, on the motion of the President, seconded by Mr. C. B. ALLEN, unanimously adopted.

President's Address.

The way was now clear for the President's Address, which as it is printed in another part of this Journal need only be summarized here. Commencing with some appropriate allusions to the return of the Conference to its birthplace, Mr. UMNEY selected for his theme an article agreed to by the founders of the Conference in 1863, to the effect that one object of the Association should be to maintain uncompromisingly the principle of purity in medicine. It may be remarked in passing that the treatment of this and other topics in the address was largely from the point of view of the wholesale druggist, a fact that was recognized by the speaker himself and apologized for on the ground that from the nature

of his business he was less perfectly acquainted with the dispenser's aspect of pharmacy. Taking as a starting point the time when in consequence of the prevalence of sophistication of drugs HENRY VIII. empowered the physicians to "search, see and view the apothecaries' wares, drugs and stuffs" and to destroy such as were found unfit for use, the speaker recalled how this power had passed to the Society of Apothecaries after their separation from the grocers, and eventually, on account of sophistications by the latter, had led to a combination of apothecaries for the production of pure medicines. The subsequent recognition by wholesale dealers of the fact that the traffic in drugs and medicines might in future be carried on more successfully by due regard being paid to purity, was a new departure, and led to the introduction of guaranteed powdered drugs by THOMAS HERRING and parallel enterprises by others, followed in its turn to greater attention being paid to the purity of chemical compounds intended for use in medicine. The founders of the Conference in 1863 recognized the importance of the subject, and the consolidation of the pharmacopœias in the following year initiated an advance in the uniformity and purity of medicine. Here reference was made to the qualifications required in the editor of a pharmacopœia, and the opinion was expressed that the suitable performance of his work became apparent when, knowing the requirements of the medical profession and the capabilities of pharmacists and manufacturers, he adopted standards and framed characters and tests that were satisfactory to all concerned. Emphasis was then laid upon the desirability that pharmacists should do all in their power to impress upon the public that household remedies should invariably be purchased of a similar strength and quality to those medicines that physicians direct to be used in compounding their prescriptions, on the ground that such a course would rid them of much outside competition. The Sale of Food and Drugs Act was next referred to and the friction that had been caused at first by, in many cases, the imperfect knowledge of officials; but it was thought that the superabundant energy had now been toned down to a reasonable pitch, and only those cases were heard of that indicated fraud on the public. In fact the speaker wondered whether the present prevalence of satisfactory reports might not be due to some of the official analysts not being sufficiently conversant with the characters and tests and commerce of drugs to enable them always to test efficiently substances submitted to them. It was also pointed out that highly trained pharmacists have neither sought nor obtained the post of public analyst in anything like the number of instances they should have done. The excise regulations as to the use of alcohol in manufactures, and the injury they have worked in restraint of British industry was next dwelt upon, recognition being accorded to the relaxations that have been granted recently. To the influences of these stringent regulations, and to the meagre opportunities hitherto afforded in this country for research work, the speaker attributed any falling behind in chemical manufactures that may have been shown by England in recent years, and in respect to the latter cause the part that might be played by the Research Laboratory of the Pharmaceutical Society was hopefully alluded to. The remainder of the address was devoted to arguments, strengthened by illustrations, as to the importance and value to the pharmacist of a sound scientific training. The address was well received, and at the close a vote of thanks was, on the motion of Mr. S. R. ATKINS, seconded by Mr. T. M. CLAGUE, enthusiastically accorded to the President.

The Conference then proceeded to the reading and discussion of papers, and following the plan adopted in previous years, a *résumé* will be given here sufficiently full to enable our readers to follow the principal points, pending the publication of the full report. The first paper read was a Note on Tincture of Senna, in which Mr. B. S. PROCTOR reiterated an opinion, expressed on previous occasions, that the official tincture of senna is an inert preparation of an active drug. In support of his position Mr. PROCTOR stated that alcohol is in this case an unsuitable menstruum and that, in fact, he had taken the rectified spirit extract from half an ounce of senna leaves without producing any effect; but that a draught made from the senna marc that had been already extracted with rectified spirit produced pretty strong catharsis with griping. In respect to proof spirit, Mr. PROCTOR said that he had taken an ounce of the official tincture of senna without any effect, and pleaded his temperance principles as a reason for not taking the quantity that would be required to produce results beyond those due to alcohol. In the discussion that followed Mr. GERRARD pointed out the desirability that the Pharmacopœia should include a greater variety in the strength of alcohol, a suggestion that was endorsed by other speakers.

Proctor on Tincture of Senna.

In the next paper read, Mr. A. BALL described the results obtained in some comparative experiments with commercial samples of papain and pepsin. From these it appeared that the papains examined by him were far inferior to the pepsins in digestive power and that in addition the peptone formed by papain was deficient in diffusive properties. Mr. BALL criticized sharply the official test requiring that two grains of pepsin should be equal to the digestion of only one hundred grains of albumen, whereas he had found that "one grain of the best pepsins in the market will digest five hundred to

Ball on Papain and Pepsin.

fifteen hundred grains when subjected to the prescribed test," and he commended "some intelligent pharmacists" who, when pepsin is ordered, dispense the pepsin guaranteed pure and free from any admixture. In the discussion that followed the pertinent question was raised as to how much albumen the pepsins for which greater activity was claimed would digest when tested strictly under B.P. conditions. But this point Mr. BALL did not appear to appreciate; at any rate the question remained unanswered.

Reynolds on the Solubility of Glass.

A paragraph that appeared in "The Month" (before, p. 163), relative to the coloration of some chloral hydrate by pigment derived from the bottle, gave Mr. REYNOLDS the opportunity for the next paper, in which he suggested that the question as to whether and how far glass bottles are soluble was one worthy of further investigation. As a contribution to the subject from personal experience he mentioned that a solution of 1 in 10,000 of hydrochloric acid in water, which when freshly made gave a distinct reaction with congo paper, failed to do so after being kept a day in a flint glass bottle. This result he was inclined to refer to the chemical interference of the bottle with its contents. Other instances were mentioned in the discussion, and Dr. THRESH referred to an observation that a "rainfall" which when collected on litmus paper he had found to be invariably acid was either neutral or faintly alkaline when collected in a bottle.

Gerrard on Extract of Stramonium.

A practical note by Mr. A. W. GERRARD on Extract of Stramonium followed. It was the record of an observation made in an emergency that in the preparation of extract of stramonium the preliminary percolation of the seeds by ether might be omitted. He found that when the seeds were exhausted with hot proof spirit the resulting tincture yielded on evaporation a satisfactory extract containing very little fixed oil, which, if desired, could be removed by washing with a little ether.

Proctor on Ferri et Ammonii Citras.

The next paper, by Mr. B. S. PROCTOR, had its origin in the observation of changes that took place in mixtures containing ferri et ammonii citras as a constituent. For instance, one mixture consisting of forty grains of the citrate to eight ounces of water gradually became turbid, depositing a brown precipitate, and the liquid eventually becoming colourless or nearly so. When the mixture was made up with hard instead of distilled water part of the precipitate was buff-coloured and part black. At first an explanation of the instability was looked for in Mr. UMNEY'S opinion, expressed in this Journal in 1873, that the official compound was deficient in ammonium citrate, and indeed a slightly better result was obtained upon the addition of a little of that salt. But that this was not a full explanation was shown by the fact that a sample that yielded 32 per cent. of ferric oxide on incineration was more stable than one that contained only 30·7 per cent. It was then observed that the residue from an incineration gave off the odour of sulphuretted hydrogen upon the addition of hydrochloric acid, and the presence of sulphate in the original citrate was confirmed by the barium test. A suggestion that a manufacturer's modification of the official process for citrate of iron and ammonium, in precipitating the ferric hydrate with caustic soda and the use of hard water, might have introduced a trace of sulphate, was negatived by the fact that a sample in the preparation of which the ferric hydrate was known to have been precipitated by ammonia gave palpable quantities of sulphate and only traces of lime. Mr. PROCTOR himself refers the contamination, which in some cases equalled 2 per cent. of sulphuric anhydride, to the conditions under which the citrate is manufactured on the large scale. It is known that when ferric hydrate is precipitated from the sulphate it will contain a notable quantity of basic sulphate, unless the caustic alkali used in the precipitation is kept continually in free excess. But when a large stream of iron liquor is poured into alkali this condition is not present, since the liquid immediately surrounding the point of impact will always contain iron in excess of alkali for a sufficiently long time to allow of the formation of basic sulphate, which may escape decomposition even after the mixture becomes more complete. The remedy suggested is to allow the two solutions to mingle in thin streams so regulated that the correct equivalent proportions are pretty closely maintained. Mr. PROCTOR'S paper also contained some interesting observations on the retardation of the precipitation of barium sulphate in the presence of a citrate.

After the reading of this paper the Conference adjourned to lunch, which on this and the following day was served in the Cambridge Hall.

Clague on Easton's Syrup.

Upon resuming, Mr. CLAGUE called attention to the fact that samples of Easton's syrup are sometimes met with which through the influence of a low temperature have undergone such change as to render them unfit for use. In one case the "syrup" was a jelly-like mass with long needle-shaped crystals and tufts of crystals, and a smaller amount of fine white precipitate showing. Warmth brought about solution, but precipitation again took place on cooling to about 32° F. It was found, however, that the addition of 25 per cent. of water sufficed to maintain solution at the lower temperature, and that this was not affected upon the addition of the quinine, strychnine and ferrous phosphate requisite to bring it up to Easton's strength. The high specific gravity of the samples pointed to excess of

sugar as the source of trouble, and it was ascertained that the precipitation and gelatinous appearance stood in direct relation to the quantity of sugar present. Mr. CLAGUE therefore recommended that where Easton's syrup finds a ready use, the original formula, containing 35 per cent. of sugar, should be adhered to; but that where it is not in so frequent demand the formula of the 'Extra Pharmacopœia' should be followed, reducing the quantity of sugar (37·5 per cent.) 10 per cent. Mr. CLAGUE also expressed regret that there should have been introduced into the B.P.C. Unofficial Formulary a preparation bearing the same name as Easton gave to his syrup, though only containing three-fourths as much quinine phosphate. In commenting upon the paper the President said he felt inclined to attribute the present relatively frequent occurrence of solidification in such syrups to cane sugar having been displaced in the market by beet sugar.

Pattinson on Nitrous Vitriol and Aerated Waters.

The note of Mr. PATTINSON on the effect of using vitriol containing a nitrous contamination in the manufacture of certain aerated waters, although having a valuable practical application, contained nothing that had not been published before. It was to the effect that the author had traced an opalescence in a sample of ginger ale to the action of a nitrous impurity derived from the vitriol used for generating carbonic acid upon the ginger essence, the colour of which it eventually discharged. The same subject was brought before the Pharmaceutical Society at an evening meeting in March, 1885 (*Pharm. Journ.*, [3], xv., 731), when Mr. NAYLOR recorded the much more important observation that the nitrous impurity is also capable of rapidly destroying the pungency of both ginger essence and capsaicin.

Braithwaite and Umney on Standardized Ipecacuanha Preparations.

The standardization of the fluid extract and wine of ipecacuanha was the subject of the next paper read, which was the joint production of Mr. J. O. BRAITHWAITE and Mr. J. C. UMNEY. For their experiments the authors had used a root estimated to contain 1·32 per cent. of emetine, and the menstruum selected as giving the best results was rectified spirit. An extract was obtained, which estimated by a modification of RANSOM'S process yielded 1·28 per cent. of alkaloid. It is therefore proposed that a standard extract, prepared by a process consisting essentially of a first maceration and percolation with spirit, and then after addition of slaked lime to the mark, of a second maceration and percolation with spirit, should be so adjusted in strength that 100 fluid parts should contain 1·25 parts by weight of emetine. From this it is proposed to prepare a standardized wine by dissolving one fluid part of the extract in sufficient sherry wine to produce twenty fluid parts.

Finding that the modified RANSOM process of assay referred to in the previous paper could be applied directly to the wine, Messrs. BRAITHWAITE and UMNEY made some experiments as to the effect of the conditions obtaining in the official process for ipecacuanha wine in the amount of alkaloid present in the finished preparation. From their results they conclude that the present official process extracts practically all the alkaloid from the root, but that a considerable proportion of it is afterwards lost in the drying and powdering of the acetic extract, so that the wine produced is far inferior in relative alkaloid strength to the root from which it is prepared. They further express the opinion that the wine of the present Pharmacopœia, although a more elegant preparation than that of the B.P., 1867, is considerably inferior to it in its chief therapeutic ingredient. Samples of the preparations referred to in this and the preceding paper were shown, and the authors were strongly complimented on their contribution towards the solution of a troublesome problem.

Braithwaite and Umney on Ipecacuanha Wine, B.P.

Blunt on Assay of Ipecacuanha Wine.

In another contribution to the literature of ipecacuanha that followed, Mr. T. P. BLUNT suggested a modification in the present method of assaying the wine for alkaloid by means of MAYER'S solution. It consisted in adding a saturated solution of mercuric chloride in potassium chloride in excess to the wine previously evaporated to remove the alcohol, and then after filtering taking the quantity of a centinormal solution of mercuric chloride that can be added to the filtrate before a permanent precipitate is produced as the measure of the quantity of mercuric chloride that has been removed from the originally saturated solution by combination with the alkaloid.

Jones on Strychnine and Morphine Hypophosphites.

In the next paper read Mr. H. W. JONES called attention to the possible value of hypophosphorous acid as a solvent of strychnine and morphine. Both these alkaloids dissolve readily, according to the author, in dilute hypophosphorous acid to form solutions which can be obtained neutral, or only very faintly acid, by using a slight excess of the alkaloid. The hypophosphite of strychnine was described as a very stable salt in solution, suitable not only for hypodermic injection, but as a substitute for the hydrochlorate in the official liquor strychninæ, which sometimes causes trouble in cold weather. The ready solubility of morphine in the dilute acid allows of a solution of 1 in 6, or even stronger, being easily prepared.

Martindale on a Methyl Chloride Apparatus.

The object of the next note, by Mr. MARTINDALE, was to bring under the notice of the Conference a convenient little apparatus for holding chloride of methyl, which has been recently introduced into medical practice as a refrigerator. This

apparatus consists of a "thermo-isolator" made of a glass test-tube fused at the top to a larger surrounding tube after the interspace has been first rendered vacuous. The vacuum acting as a non-conductor the methyl chloride may be kept in the jacketed test-tube for some time without undergoing the volatilization which takes place almost immediately when the liquid is released from pressure under ordinary conditions. It is thus rendered accessible for saturating tampons for direct application to any part of the body and for similar purposes, when it is not desired to apply the refrigerator as a spray.

With the reading of this paper the business proceedings of the Conference terminated for the day. After partaking of "afternoon tea" in the rooms of the North of England Pharmaceutical Association the company proceeded for a drive through the parks and a walk through Jesmond Dene.

On Wednesday morning the Conference resumed its proceedings with some Chemical Observations on the Root Bark of *Euonymus atropurpureus*, by Messrs. W. A. H. Naylor and E. M. Chaplin. This paper represented the useful class of work which consists in repeating the experiments of previous observers. In this instance the authors regulated their proceedings by the experiments on euonymus root bark made by Mr. W. T. Wenzell, as recorded by him in a paper published in the *American Journal of Pharmacy* in 1862. They report that they have separated from the bark an unidentified crystallizable glucosidal principle, to which they have given the name "atropurpurin," Wenzell's "euonymin," citric, tartaric and malic acids, neutral fixed oil, crystalline free fatty acid or acids, an acrid and pungent principle, yellow and brown resins, bitter extractive and wax. Their results differ from Wenzell's chiefly in that instead of asparagin they obtained atropurpurin, which contains no nitrogen; besides which they got bitter extract instead of a soft resin, free fatty acid in place of crystalline resin, brown resin soluble instead of insoluble in ether, and an acrid pungent principle that Wenzell failed to detect.

Naylor and Chaplin on Euonymus Bark

In the next paper Mr. Siebold referred to the great faith shown by some therapeutists in the superior solvent action of lithia upon uric acid, and pointed out that this faith extends not only to the carbonate and citrate, which are capable of acting as antacids, but also to mineral waters containing mere traces of lithium compounds and those in the form of chloride or sulphate. In a series of experiments made to ascertain how far this faith has a chemical foundation, he found that the solvent action of solutions of lithium, sodium and potassium carbonates on a given weight of uric acid, pure or as deposited from urine, or on a given weight of urinary sediment consisting of acid urates, under exactly similar conditions, is strictly proportional to the ratio of the molecular weights of these solvents. Further that lithium chloride and lithium sulphate have no solvent action on uric acid and acid urates, and lastly that the degree of alkalinity of urine produced by the internal administration of medicinal doses of lithium citrate is not greater than that produced by equivalent doses of potassium citrate.

Siebold on Misconceptions about Lithia.

Consequent upon some statements that have been made recently, respecting the occurrence of arsenic in glycerin, Mr. Siebold's attention has been directed also to that subject, and in the paper next read he reported the results of the examination of a number of samples for the presence of such a contamination. The experiments were not extended to low qualities of glycerin, but were confined to colourless and odourless samples sold for toilet and pharmaceutical purposes. The majority of the samples tested proved to contain arsenious acid varying in proportion from 1 part in 4000 parts to 1 part in 6000. A few samples exceeded this proportion, and one contained as much as 1 part in 2500. Some samples that were found free from arsenic were traced all to one process of manufacture, which was described as being that by which as a rule glycerin used for dispensing purposes is understood to be made. The process followed in testing, which was demonstrated by Mr. Siebold, was a modification of one recently recommended by Vulpius and Flückiger, which depends upon the action of the gas given off by a mixture of the glycerin with zinc and very dilute hydrochloric acid in a test tube upon a paper cap that has been touched with a drop of a solution of mercuric chloride, a yellow spot being the result of the presence of minute traces of arsenic. A further observation by Mr. Siebold was consistent with arsenic being sometimes introduced into glycerin from the glass of the containing bottle, and it is proposed to further investigate this point; but there was a general agreement among the speakers that such quantities of arsenic as those found in some cases were more probably introduced during the manufacture.

Siebold on Arsenic in Glycerin.

The special object of the paper next read, by Mr. R. Reynolds, was to point out that the report of a chemical analyst on the presence or absence of lead in any particular sample of drinking water, should be so framed as to guard against it being taken to mean more than it stated. It was pointed out that the quantity of lead taken up by an acid water might vary considerably with the conditions, and that therefore the results of an analysis of a water that had been subjected to a minimum influence might have no relation to the results obtained with the same kind of water after it had been submitted

Reynolds on Lead in Water.

to more energetic or prolonged action. This was illustrated by the results obtained in the examination of a sample of water drawn at 7 a.m., when it had probably lain in contact with the pipes for some hours, which gave 0·35 grain of lead per gallon, and one drawn three hours after, which gave only 0·1 grain per gallon. It was therefore suggested, among other ways, that relative certainty should be secured by the analyst directing that samples of water intended for analysis should be left in contact with the ordinary service pipe for twenty-four hours.

Allen on Strychnine Vermin Killers.

In a paper on Vermin Killers containing Strychnine, Mr. A. H. Allen next gave the results of the examination of a number of samples of vermin killer obtained from different sources. These appeared to show considerable variation in the absolute and relative quantities of strychnine they contained. The principal interest of the paper lay in a suggestion as to the use of pigments for the coloration of such powders, which in those examined were ultramarine, prussian blue and carmine. Mr. Allen is of opinion that a preferable substance would be found in chrome green, or green oxide of chromium, principally on the ground of its great stability. Further he thought arsenical fly papers should be impregnated with some soluble colouring matter, which would colour water in which they are placed, and for this purpose he suggested indigo-carmine, or sulphonated indigo might be used.

Proctor on a Scale of Small Residues.

In washing precipitates or exhausting drugs by percolation it often becomes important to be able to estimate the amount of solid matter that the solvent is extracting. With a view to aiding the judgment Mr. Proctor has constructed a scale of standards for comparison consisting of the residues of the evaporation on glass slides of drops of liquid containing from one millionth to one thousandth of a grain of solid matter. The materials selected are calcium sulphate, potassium nitrate, gum acacia and gum tragacanth. The lower dilutions are made with water, but for the higher dilutions spirit is used in order to avoid vitiation of results by the fixed matter present even in distilled water.

Christy on Strophanthus.

This was followed by a paper in which Mr. Thomas Christy gave the results of observations on various parcels of strophanthus seeds received by him since 1878 and of plants grown from some of them. So far as could be gathered his opinion coincides with that already expressed by Professor Fraser, that seeds received under the name "kombé," although differing in some minor respects from "hispidus" seeds, are like them referable to *Strophanthus hispidus*. The seeds of "*Strophanthus glabrus* of Gaboon" were stated to yield a "crystallizable alkaloid," but if this be correct it will be apparent from Professor Fraser's results that they differ in this respect from the seeds of *S. hispidus*. Another variety of seeds was referred to under the name *Strophanthus minor* (B.), "very small in size, blunt at one end and having a spike at the other," thought to be suggestive of the appellation "turtle strophanthus," which appears to have contained little active principle. A number of specimens were shown to illustrate the great diversity in leaf presented by plants grown from seeds received in the same parcel.

Fraser on Strophanthus.

The next paper read may be looked upon as one of the most important—as it was certainly the most elaborate—brought under the notice of the Conference at the Newcastle meeting. It consisted of a *résumé* of recent work done by Dr. T. R. Fraser upon the chemistry of strophanthus seeds, and appeared to be a continuation or development of the paper read by him before the Royal Society of Edinburgh a few months since and reported in this Journal (Feb. 16, p. 660), in which he dealt principally with the botany of this new and important drug. In the present paper the results obtained by treatment of the triturated dried seeds with petroleum ether, ethylic ether, water and rectified spirit, are recorded, but for the purposes of this note detailed reference need only be made to the alcoholic extract, since it contained the whole of the active principle, strophanthin. An alcoholic extract obtained after removal of fat by ether amounted to 8·94 per cent. of the original weight of the seeds and it was estimated to consist of 63·367 per cent. of impure strophanthin, 16·275 per cent. of mucilage and 14·542 per cent. of resin. The extract was the product of three successive percolations, the first with 10 parts of rectified spirit and the other two with 5 parts each. It was found that the first percolation removed 7·9 per cent. of the 8·94 per cent. of extract obtained, and that it was very much richer in strophanthin than the products of the succeeding percolations, nearly all the active principle being extracted by the 10 parts of spirit and in a more satisfactory state than in the later portions of the extract. Further experiments showed that most of the colouring matter, resin and mucilage is derived from the testa and most of the strophanthin and oil from the cotyledons and embryos. Treatment of the dry extract as well as of an aqueous solution with reagents failed to indicate the presence of an alkaloid, but the reduction of Fehling's solution by solutions of the extract in dilute acids gave evidence of a glucoside. This action was satisfactorily connected with a substance that appeared in well-formed crystals during the evaporation of non-acidulated watery solutions of the extract, and which was identified as the active principle strophanthin. In fact it was found that strophanthin is readily decomposed

by weak solutions of acids, yielding glucose and a body that has been named "strophanthidin," which crystallizes so readily that it is thought that its production in an extract by treatment with an acid might be taken as an indication of the amount of active principle originally contained therein. Strophanthin is difficult to separate; but it was obtained pure by a somewhat tedious process depending upon the formation of a tannic acid compound and subsequent decomposition by lead oxide, and it yielded upon analysis results corresponding with the formula $C_{16}H_{26}O_8$. Strophanthidin, the product of decomposition of the glucoside, is described as having an intensely bitter taste and a neutral reaction, and as being very slightly soluble in water, moderately soluble in cold and freely in warm rectified spirit. It is extemely active as a pharmacological agent, with symptoms closely resembling those of strophanthin. Strophanthin was also found to be present in the comose appendages and the seeds, the pericarp of the follicles, the leaves, branches, stem and root. No alkaloid was detected, but in the lead precipitate from an aqueous solution of the alcoholic extract a compound was found, of strongly acid reaction and freely soluble in water, to which the name "kombic acid" has been given.

Recent statements as to the extent to which commercial narceine is affected in its therapeutic action by contamination with other alkaloids, together with the paper by MERCK on chemically pure narceine, seem to have constituted the *raison d'être* of the next paper, by Mr. DOTT, on Narceine and its Salts. Mr. DOTT is of opinion that considering the facility with which narceine can be separated from morphine and codeine it is highly improbable that any manufacturer would send out the alkaloid so contaminated; but even supposing that some morphine and codeine were present in the narceine it is difficult to conceive how they would affect its action. With respect to MERCK's paper, Mr. DOTT points out also that the tenacity with which narceine retains hydrochloric acid had been previously recorded by Dr. WRIGHT, who obtained pure narceine from the basic hydrochloride by converting it first into sulphate. As to the nature of the basic hydrochloride, Mr. DOTT does not think it to be a mixture or compound of the normal hydrochloride with the alkaloid, but that in it so many molecules of alkaloid are loosely combined with so many molecules of hydrochloric acid, after the manner of the relation of water of crystallization to a salt molecule.

Dott on Narceine.

The official standard of the citricity of lemon juice was the subject of the next paper, in which Mr. T. HOWELL WILLIAMS expressed the opinion that this is now fixed much too high. In the B.P., 1867, the specific gravity was stated as 1·039 and the contents of a fluid ounce in citric acid as 32·5 grains; in the B.P., 1885, the specific gravity is given as 1·035 to 1·045 and the citric acid as 36 grains to 46 grains to the fluid ounce. In Mr. WILLIAMS's opinion, 30 to 36 grains of citric acid in the ounce would more correctly represent the amount present in the lemon juice as commonly obtained from the finest imported fruit during the winter months and from 20 to 30 grains when the juice is pressed in summer or autumn. In support of this opinion he quoted some memoranda from the laboratory books of his firm.

Williams on Lemon Juice.

The title of the next paper read was "Tannin: its Solubilities, etc.," the author being Mr. B. S. PROCTOR. It contained the record of a very large number of experiments, undertaken with a view to get an explanation of the somewhat anomalous behaviour of tannin towards ether. According to the B.P., tannic acid is only sparingly soluble in ether, but Mr. PROCTOR confirms some previous observers in the statement that ether is really capable of forming a solution with a relatively large quantity of that compound. What appears to happen when commercial tannin is added to methylated ether is that after a time two ethereal layers are formed, one heavy and turbid and the other light and clear, and that with successive additions of tannin the lower stratum increases in bulk and the upper one decreases and finally disappears. In one experiment this point was reached when 180 grains of tannin had been added to about 235 grains of ether, and the liquid then yielded on filtration a very small quantity of insoluble and was still unsaturated. The experiments were varied in many ways, involving higher rectification of the ether and drying of the tannin, but the nature of the solution, whether one of ether in tannin or tannin in ether, or whether an etherate is formed, cannot yet be said to be demonstrated. The solubilities of tannin in water, alcohol, and other menstrua were also given.

Proctor on Tannin Solubilities.

The next paper, by Mr. L. W. HAWKINS, dealt with the subject of the amount of hydrocyanic acid occurring in wild cherry bark and the proportion of this which finds its way into pharmaceutical preparations of the bark. Six samples of bark from different leading houses, examined by distilling the finely powdered drug with water and titrating the distillate with centinormal silver nitrate solution, gave results corresponding to a yield of hydrocyanic acid ranging from 0·079 per cent. to 0·160 per cent. The preparations in use are the liquid extract, infusion and syrup of the U.S.P. and the tincture of the B.P.C. Formulary. Commercial specimens of the liquid extract, which is supposed to represent its weight of bark, gave very poor results, the highest quantity of hydrocyanic acid in any of six samples

Hawkins on Wild Cherry Bark.

being 0·030 grams in 100 c.c. and in two cases none at all. A sample made by the author strictly according to the U.S.P. formula from a bark containing 0·137 of acid only contained in the finished product 0·084 per cent., apparently showing that the portion of the menstruum not subjected to the influence of heat is insufficient to extract the whole of this constituent. Commercial samples of the infusion and syrup also gave results considerably below the theoretical quantity, supposing that they were made from average quality bark, although it was demonstrated that a much nearer approximation could be obtained by following the U.S.P. processes. A similar remark applies to commercial samples of the tinctura pruni virginianæ, B.P.C. The author, therefore, drew the conclusion that preparations of wild cherry bark do not, as a rule, represent the full value of the drug, so far as hydrocyanic acid, its supposed active constituent, is concerned, and that this might be caused by loss of acid in keeping or insufficient care in preparation.

In the next paper read, Mr. JOHNSTON raised the old vexed question of concentrated infusions, with a view to the introduction of some such preparations in the next edition of the British Pharmacopœia. In order to give a practical turn to the discussion he suggested the following formula for a concentrated infusion of gentian :—

Johnston on Concentrated Infusion of Gentian.

"Take of—

Bitter orange peel, bruised Gentian root, bruised	of each, 3 ounces.
Fresh lemon peel	6 ounces.
Rectified spirit	7½ fluid ounces.
Cold distilled water . . .	15 ounces.
Boiling distilled water . .	a sufficiency.

Mix the orange peel and gentian root with the spirit and cold water, and, into the mixture contained in a suitable vessel, such as a wide-mouthed jar to which a bung can be fitted, grate the lemon peel. Macerate for seven days, stirring occasionally; strain through a press bag or piece of calico, and press out the rest of the infusion. Remacerate the marc with about twelve ounces of boiling distilled water for twelve hours, and again press. Mix the liquid obtained with the previous portions, and set aside for a few days, afterwards filtering and making up with distilled water to a pint and a half."

In respect to the lemon peel it was recommended that the yellow portion should be grated from previously weighed lemons (about six will be required) directly into the liquor, and as much of the spongy part as may contain essential oil pared off and added also, the quantity being checked by noting the loss of weight in the lemons. Such a preparation, when mixed with seven parts of distilled water, was stated to yield a liquid exactly the same in colour, aroma and bitterness as the freshly-made B.P. infusion. Recognizing the possibility of an objection that the formula would yield a weak tincture rather than an infusion, Mr. JOHNSTON thought this would be hypercritical, and suggested that where the physician wanted to avoid even this quantity of alcohol he might order "inf. gent. co. recent." It was admitted however, that, all the infusions might not be so easily represented by concentrated preparations.

As a sequence to the previous paper Mr. JOHNSTON sent a note suggesting a modification in the official formulæ for tincture of lemon and tincture of fresh orange peel, which consisted practically in adopting the method proposed for grating the peel.

Johnston on Tincture of Lemons.

In a paper read at an evening meeting of the Pharmaceutical Society in Edinburgh last year Mr. MACPHERSON criticized the formulæ given in the British Pharmacopœia for what are known as the 1 per cent. solutions, on the ground that they do not yield preparations in accordance with their reputed strength. The strychnine solution especially was singled out as one in which the proportional parts formula differs from that in which imperial weights and measures are used, and an amended formula was given by which it was claimed that a true 1 per cent. solution could be obtained whether the imperial weights and measures or the proportional quantities were used. Following up a suggestion made by Dr. ATTFIELD Mr. MACPHERSON has since extended his work and now presented a series of formulæ for the other liquors constructed on the same principle. For the sake of uniformity imperial quantities for eight ounces of solution are given in each case; otherwise official data have been adhered to as far as consistent with bringing the finished products into consonance with their reputed strength.

Macpherson on Official One per cent. Solutions.

Following up his work on the official liquors still further, Mr. MACPHERSON proposed in another note that solution of meconate of morphine should be brought into uniformity with the other alkaloidal solutions, and made to contain one per cent. of meconate of morphine instead of about 1¼ per cent. of the "bimeconate," as stated in the present official formula. For this purpose he has contrived two formulæ, one starting with morphine meconate and the other with morphine hydrate. Mr. MACPHERSON also proposes that the name of the preparation should be changed to "Liquor Morphinæ Meconatis," as being more correct than the present official one, the "bimeconate" having been shown by DOTT in this Journal to be a hypothetical compound.

Macpherson on Liquor Morphinæ Meconatis.

In view of the fact that solutions supplied as SCHEELE'S prussic acid are known to vary in strength Mr. WRIGHT'S report on the strength of some commercial samples examined by him serves a useful purpose. It appeared that the range in twelve commercial samples was between 3·6 and 5·7 per cent. of HCy, or a difference of no less than 2·1 per cent. Mr.

Wright on Strength of Prussic Acid.

WRIGHT suggests that the Formulary Committee might do something towards securing more uniformity in the strength of this potent agent.

Wright on Menstrua for Aconite and Belladonna.

With a view to ascertaining whether chloroform presents any advantages over alcohol in the extraction of aconite and belladonna, as suggested in SQUIRE'S "Companion," Mr. WRIGHT made a series of experiments using alcohol, chloroform and mixtures of alcohol and chloroform in different proportions as menstrua. With belladonna the best results were obtained with a mixture of four parts of alcohol and one of chloroform, 20 c.c. of a tincture made by maceration and percolation of 50 grams of the powdered root with sufficient menstruum to produce 100 c.c. containing 40 milligrams of alkaloid, against 30 milligrams contained in the same quantity of a rectified spirit tincture, and 11 milligrams in a chloroform tincture. In the case of aconite the best results were obtained with a mixture of three volumes of alcohol and one of chloroform, 20 c.c. containing 76 milligrams of alkaloid against 66 milligrams in the alcoholic tincture and 34 milligrams in the chloroform tincture.

Wright on Sodium Salicylate.

A third note by Mr. WRIGHT related to an impurity observed in a sample of commercial sodium salicylate, which was not easily and completely soluble in cold water. An examination of the insoluble residue left no doubt that it consisted of salicylic acid.

Mootooswamy on Casearia esculenta.

The last paper read was a contribution from India, being an account, by Dr. MOOTOOSWAMY, of Tanjore, of a drug said to be coming into use as a remedy for chronic enlargement of the liver, hepatic obstructions, piles and diabetes. It consists of the root of *Casearia esculenta*, bearing a native name owing its origin to a "supposed property of drying up the sea." According to an analysis by Mr. D. HOOPER the root contains 3 per cent. of neutral resins soluble in ether and partly soluble in spirit, an organic acid having the characters of cathartic acid, and about 10 per cent. of a tannin giving a green colour with ferric chloride, which, however, does not prevent the drug from acting as an aperient.

At the conclusion of the reading of the papers the presentation of books, provided by the BELL and HILLS fund, supplemented by a copy of HANBURY'S Science Papers and 'Pharmacographia,' given by Mr. THOMAS HANBURY, was made to the North of England Pharmaceutical Association and suitably acknowledged by its President, Mr. N. H. MARTIN. This was followed by the re-election of the Formulary Committee, a vote of thanks to the College authorities for the use of the building, and another well-earned and enthusiastic vote of thanks to the Local Committee, coupled especially with the names of Mr. N. H. MARTIN, Chairman, Mr. T. MALTBY CLAGUE, Secretary, Mr. B. S. PROCTOR and Mr. HARRISON. Mr. REYNOLDS then in eloquent terms invited the Conference to meet next year in Leeds, and the invitation having been supported by Mr. WARD, was unanimously accepted.

The Conference then proceeded to the election of officers for the ensuing year, and at the request of the meeting the Chairman deposited a unanimous ballot for the following list which had been proposed by the outgoing executive:—

President.—C. Umney, F.I.C., F.C.S.

Vice-Presidents.—M. Carteighe, F.I.C., F.C.S., S. Plowman, F.R.C.S., A. Kinninmont, W. Smeeton.

Treasurer.—W. Martindale, F.C.S.

Hon. General Secretaries.—W. A. H. Naylor, F.I.C., F.C.S., and J. C. Thresh, D.Sc., M.B.

Local Secretary.—F. W. Branson.

Other Members of the Executive Committee.—J. E. Brunker, M.A., M. Conroy, F.C.S., R. H. Davies, F.I.C., D. B. Dott, F.R.S.E., A. W. Gerrard, F.C.S., T. Maben, F.C.S., B. S. Proctor, F.I.C., F. Ransom, F.C.S., J. Harrison.

Auditors.—T. Rheeder, and G. Ward.

This being the conclusion of the business a hearty vote of thanks was given to the President for his able and courteous conduct in the chair.

The Excursion.

About five o'clock, notwithstanding a downpour of rain, a numerous party embarked on a special steamer for a trip down the Tyne; but it is to be feared that the weather prevented the full enjoyment of the excursion.

Thursday opened with atmospheric conditions very unpromising to members of the Conference and their friends who had looked forward to joining in the excursion that had been arranged by the Local Committee. By the time of starting, however, the rain had ceased, and although the sun was not much in evidence, water-proofs and umbrellas proved to be superfluities. At nine o'clock the special train left the Central station with one hundred and eighty passengers, the first stopping-place being Hexham, which was reached just before ten. Here a visit was made to the beautiful abbey church, and Mr. J. P. GIBSON, a local pharmacist, recounted the principal events in its history and explained the antiquities in a most able and interesting way. Some of the visitors then went to see other places of interest in the town, under the guidance of Mr. W. R. RIDDLE, whilst others went for a stroll through the wood in the Duke's House Grounds. At noon the company assembled in the Town Hall, where an excellent lunch was provided, after which hearty recognition was made of the excellent service that had been rendered by the organizers of the excursion, Messrs. GIBSON, RIDDLE, CLAGUE and HARRISON. Joining the train again a start was made for Rothbury, which was reached about three o'clock, when a most enjoyable couple of hours were spent in strolling through the wonderfully beautiful grounds attached to Lord ARMSTRONG'S seat at Cragside. Then followed an ample and most refreshing tea, and the company having again rejoined the train the return was made through Morpeth to Newcastle, where they arrived about eight o'clock.

The length to which this abstract of the proceedings has already extended necessitates brevity in any further remarks; but it would not be right to omit a word of congratulation to the Local Committee upon the outcome of their arrangements for one of the most successful meetings that the Conference has yet held. As Chairman of that Committee, Mr. N. H. MARTIN must be well pleased with the result of the arduous task carried out under his supervision, whilst Mr. T. MALTBY CLAGUE, the Honorary Secretary, may pride himself upon having secured the hearty thanks of all the members that took part in the proceedings, whether serious or festive, for the unsparing and genial way in which he laboured to secure their comfort and enjoyment.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council was held on Wednesday the 4th instant at the rooms of the Society, No. 11, Harcourt Street, Dublin, at three o'clock.

The President, Mr. Charles Evans, in the chair.

The other members of the Council present were Messrs. Hodgson (Treasurer), Beggs, Wells Hayes, McCormack, Baxter, Merrin, and Professor Tichborne.

The President said that ten days after the last Council meeting Mr. Hodgson and himself called on Mr. Allen, in pursuance of a request of the Council, for the purpose of asking him to reconsider his intention of withdrawing from the Council. Mr. Allen was out; but on the next morning he (the President) received a letter from him saying that it was his fixed determination not to allow his name to go forward for re-election. On receipt of that letter he and Mr. Hodgson considered it useless to call on Mr. Allen again. He was sure they all regretted Mr. Allen's decision.

Mr. Hodgson said that personally he regretted it very much. He felt that they would sustain a serious loss in Mr. Allen's withdrawal, as he was a most useful member of the Council.

The minutes of the last meeting were then read by the Registrar, Mr. Ferrall, and afterwards signed by the President.

The President said a letter had been received, written in French, from the Secretary of the Committee for organizing the meeting of the Seventh International Pharmaceutical Congress at Milan in September, 1890, asking whether the Council would send representatives to it.

It was ordered that the Registrar should write thanking the Committee for the invitation, and intimating that it was rather premature to appoint representatives.

A letter was read from Mr. McCreery Hill, Honorary Secretary of the Irish Pharmaceutical Chemists' Association, thanking the Council for the permission which it had given to that association to hold its meetings in the Council room, and stating that it would always be the endeavour of the association to promote the interests and well being of the Society, and to secure for its licentiates the privileges granted to them by the Irish Pharmacy Act of 1875.

The President said that after the permission had been given letters addressed to the Irish Pharmaceutical Chemists' Association began to come to No. 11, Harcourt Street; in consequence of which he directed Mr. Ferrall to write to the Secretary of the association on the subject.

The Registrar read the letter which he had written, dated August 16, which pointed out that the leave granted to use the room for meeting in did not include a permission to the association to use No. 11, Harcourt Street as their official address and requested that that should be discontinued.

Mr. Wells produced a card of the Irish Pharmaceutical Chemists' Association summoning one of their meetings, and also a circular explaining their objects, on both of which the address "11, Harcourt Street," was printed. He had spoken on the subject to Mr. Hill, who at first thought there was an intention to slight the association involved in the objection to their using the address; but he (Mr. Wells) explained to him that if it were allowed to be continued the Registrar would be inundated with letters which it would be hard to distinguish from those intended for the Council.

Professor Tichborne: We agreed to lend them the room to meet in, but nothing else.

Mr. Hodgson said that to allow the association the use of the rooms as an official address for the transaction of all their business would be to do a thing which the Council had no right to do. He questioned the wisdom of granting the use of the room at all.

Professor Tichborne said he quite agreed with Mr. Hodgson.

The President said it was only right to mention that since this question had been raised he had received a letter from Mr. Hill, stating that the wishes of the Council respecting correspondence would be complied with, and that it would no longer be sent to 11, Harcourt Street.

The Registrar was directed to write to Mr. Hill stating that the permission given to the Association only extended to the use of the room for their meetings, *once* a month, and that the summonses should contain a statement that that was by permission of the Council of the Society.

A letter was received from Dr. I. W. Moore, Registrar of the King and Queen's College of Physicians, enclosing one from the Privy Council stating that the latter body declined to sanction the scheduling of carbolic acid as a poison.

Mr. Wells: Did we ask the College to take action?

The President: Yes, at a time when there had been several cases of poisoning by carbolic acid.

Mr. Wells: It is constantly given out to people by sanitary officers in England. I believe there have been more cases of accidental poisoning from it than from all the other poisons put together.

Mr. Hayes: It is not from druggists that people get it, but from the sanitary authorities.

Mr. Wells: We can only thank the College for their action, and express our regret that they were not successful.

Mr. Hodgson: And that our opinion on the subject is unchanged, as it is a very dangerous poison.

The Registrar was directed to write to Dr. J. W. Moore, thanking the College of Physicians for their action in the matter, and expressing the regret of the Council that the Privy Council had not seen their way to including carbolic acid in the schedule of poisons, as the opinion of the Pharmaceutical Society remained unchanged as to the necessity for it. A letter was read from Mr. Pring, tendering his resignation as a member of the Pharmaceutical Council.

The President: I am sure we all regret this. It would be a serious loss to the Society at this time to lose Mr. Pring.

Professor Tichborne: I propose that Mr. Pring be asked to reconsider his resignation. It has been almost invariably the custom of the Council to take this course in a case of the kind. We cannot afford to lose such a man as Mr. Pring. Although he was not a constant visitor, his great experience and the interest he always took in the Society, entitle him to the best consideration we can give him.

Mr. Hodgson said he fully endorsed what Professor Tichborne had said. Mr. Pring was one of the original members of the Society, and in its early history he knew the great services he was able to render to it.

On the motion of Professor Tichborne, seconded by Mr. Hodgson, the following resolution was passed:—

> "That the Council have received the letter containing Mr. Pring's resignation with great regret, and it is the unanimous wish of the Council that he may see his way to withdraw it."

The following letter, dated from Paris, was received from Mr. Greenwood Pim, Secretary of the Committee of Management of the College of Physicians and College of Surgeons Conjoint Examinations:—"Dear Sir,—Your favour of the 9th was sent here. In reply, I am to say that under the new regulations coming into force in October, the only certificates recognized in pharmacy will be from (A) duly recognized hospitals; (B) a recognized course of demonstration; and (C) service as assistant or apprentice to

an apothecary. Hence certificates from licentiates, except as above, will not be accepted. I will have a copy of the regulations sent to you."

A copy of the regulations referred to in the above letter was also received.

The President read from the regulations the following passage:—"Every candidate is required before admission to the first professional examination to produce, with respect to practical pharmacy, (1) Evidence of attendance for three months in the compounding department of a clinical hospital, which hospital shall have satisfied the Committee of Management that its means of instruction are sufficient, and shall return to the Committee the names of its students at the comment of the course, together with the record of their attendances at its close; or (2) evidence of attendance on a course of practical pharmacy in a recognized medical school, the course to consist of not less than twenty demonstrations; or (3), evidence of having served a full apprenticeship of three years, or of having acted as paid assistant for not less than one year in the establishment of a licentiate apothecary, or of a *registered pharmaceutical chemist*."

Mr. Beggs: That is not so bad as we were given to understand.

Mr. Wells: When I moved in the matter we were led to believe that our certificates would not be accepted.

Mr. Hodgson: Mr. Pim's letter excludes pharmaceutical chemists.

Mr. Wells said the printed regulation admitted evidence of apprenticeship to or service with a pharmaceutical chemist.

Mr. Hodgson said it would be desirable for the Registrar to write again to Mr. Pim, as his letter did not coincide with the printed regulation. It would be hard that the young men of that Society should be excluded from these examinations, when they could learn their business better in three months by service with a pharmaceutical chemist than they could in an hospital in twelve.

On the motion of Mr. Hodgson, seconded by Mr. Wells, the Registrar was instructed to write to Mr. Pim, calling his attention to the fact that his letter did not coincide with the printed regulations, the provision in favour of pharmaceutical chemists not being mentioned in the former.

Letters were read from Messrs. Clark and Gilbert enclosing certificates of practical pharmacy in lieu of documents which they had previously lodged.

The President: Should there not be a general rule requiring the students to send in copies of their original certificates along with the certificates themselves—so that when we had compared the one with the other we could keep the copies and send back the originals?

Mr. Wells said it would be better to keep the original documents in the first instance, and let the students afterwards send in copies when the originals could be returned.

Mr. Hayes said he did not see the use of keeping original documents.

Mr. Wells: A resolution was passed by the Council that we should keep the original certificates.

It was ordered that the original indenture and certificate sent by Messrs. Clark and Gilbert should be returned to them.

A letter was received from Messrs. Casey and Clay enclosing a detailed account of their charges in connection with the Pharmacy Bill of 1888. A cheque was ordered to be forwarded to Messrs. Casey and Clay.

A letter was received from the "Live-and-let-Live Association of Pharmaceutical Chemists," which had lately styled itself the "Liberal Pharmaceutical Association," representing that the Council had misapprehended the sense in which they had used the word "liberal" in their title, and renewing under their changed name their request to be allowed the use of the Council room for their meetings.

The President: Gentlemen, what is your wish as to this?

Mr. McCormack: I should be very much inclined to let them live outside.

Mr. Hayes: The simplest way is to say that the Council do not see their way to granting the request.

The Registrar was decided to write accordingly.

A letter from Mr. Downes on the subject of a question which he had raised as to the suspension of standing orders was read. The Registrar was directed to reply that his request could not be granted.

A letter was read from Mr. J. H. Henry, Cookstown, forwarding an Intermediate Education Board certificate of proficiency in certain subjects, with a request that the Council would accept it in lieu of the Preliminary examination.

Professor Tichborne: It will be for the Registrar to see that it includes all the subjects. With that proviso I move that the certificate be accepted.

Mr. Hayes seconded the motion, which was agreed to.

A letter was received from Mr. Hill complaining that certain licentiates whose admission as members of the Society he had seconded at the meeting of the Council preceding the last one, should have been renominated at the last meeting.

The President said there was a misunderstanding on Mr. Hill's part about this matter.

Mr. Wells said the regulations provided that members of the Society might be present at meetings of the Council, but could not "take any part in its proceedings." Therefore a member of the Society could not second the nomination of a licentiate for membership.

It was ordered that Mr. Hill should be referred to the regulations on the subject.

A letter was received from the editor of the *British and Colonial Druggist* calling attention to some inaccuracies in the calendar with respect to the addresses of members.

Professor Tichborne said they were obliged to the Editor for his kindness in the matter.

The Registrar was directed to write to the Editor of the journal named, thanking him for his information.

A report was read from the Law Committee which recommended a prosecution in a particular case.

Mr. Wells: We have got a number of new members and we should show them that we mean to do something for them.

The report was adopted.

On the motion of Mr. Wells, seconded by the Vice-President, the following gentlemen were elected members of the Society:—Mr. Robert Jones, L.P.S.I., Cavan, Mr. Thomas Dawson Tate, L.P.S.I., 33, Berkeley Road, Dublin, Mr. Henry Conyngham, L.P.S.I., 11, Upper Baggot Street, Dublin, Mr. John Isaac Bernard, L.P.S.I., Merrion House, Booterstown, Dublin, Mr. Thomas James English, L.P.S.I., 15, Rathgar Road, Dublin, Mr. Adam Rankine Gibson Clark, L.P.S.I., 89, Amiens Street, Dublin, Mr. John Edgar Connor, L.P.S.I., 79, Hill Street, Newry, Mr. George Brown, L.P.S.I., 20, Wexford Street, Dublin, Mr. John Nugent Harris, L.P.S.I., 3, Knox's Street, Sligo, Mr. Bernard J. Costello, L.P.S.I., 8, Christchurch Place, Dublin.

On the motion of Mr. Beggs, seconded by Mr. McCormack, Mr. Arthur Raynor, of Love Lane West, Dublin, was admitted a member of the Society.

On the motion of the President, seconded by the Vice-President, Mr. Joseph John Macaulay, of Hollywood, Belfast, was admitted a member of the Society.

On the motion of Mr. Wells, seconded by Mr. Hayes, Mr. Hugh Montgomery was nominated for membership.

On the motion of Mr. Wells, seconded by Professor Tichborne, Mr. Rudolph A. C. Burns was nominated for membership.

The Council then adjourned.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.

The business of the twenty-sixth annual meeting of the British Pharmaceutical Conference commenced on Tuesday morning in the beautiful and commodious new building of the Durham College of Science, Barras Bridge, Newcastle-on-Tyne, Mr. C. Umney, F.I.C., F.C.S., President for the year, in the chair. There was a large attendance, a goodly number of ladies being present.

Welcome to the Conference.

Professor Garnett, Principal of the College, commenced the proceedings by welcoming the Conference in the name of the President and Council of the Durham College of Science. He said that in the erection of that structure it had been the hope of the College Council and Governors that it should prove to be a centre from which literary and scientific education might radiate over the north of England and a home towards which the literary and scientific institutions of the district might naturally converge. In that hope they had not been disappointed, for during the short time that that building had been in existence it had been used by a large number of the scientific societies of the town. The Pharmaceutical Conference had already done much valuable work, but there still remained much for it to do, especially in the direction of systematizing the scientific education of candidates for the position of pharmaceutical chemist. The President had conferred upon science and on his profession, by his researches into the chemistry of drugs, such benefits, that if this meeting were the means of inducing some few others to follow in his steps, the College authorities would feel they had done really valuable work in inviting the Conference to assemble in the premises. Professor Garnett then gave a brief *résumé* of the history of the College of Science, which was formed eighteen years ago, but which had only recently been able to secure ground and buildings of its own, the latter being at present still far from complete, though thoroughly so in the departments of chemistry and physics, and there being also a building which was largely used for technical classes for the museum and fine art department, and which was also used by the North of England Pharmaceutical Association. The members of the Conference would be welcome to inspect the building and arrangements of the College, and in conclusion he repeated the welcome he had offered in the first instance to the Conference.

Mr. W. H. Martin, Vice-President, having thanked Professor Garnett for the interest and kind courtesy which he had always shown in and towards pharmacists, and the facilities he had placed at their disposal on all occasions, welcomed the Conference to Newcastle, on behalf and in the name of the pharmacists of the North of England. Newcastle was its old home, and though some present visited the town for the first time they were happy in bringing with them three of the fathers of the Conference. He referred to him in whose brain first sprang the germ of the idea of an annual conference, Mr. Schacht; to him who some few years afterwards gave it practical shape, Mr. Reynolds; and thirdly, to him in whose enthusiasm the germ came to life, and the Conference was born in Newcastle, Mr. Brady. All these were still with them, but in twenty-six years it was inevitable that some gaps would occur, and he might be excused for alluding especially to the first President, Henry Deane, who perhaps did more to make the Conference a success, from the pharmaceutical point of view, than any other man. In conclusion he desired to say that the whole of the pharmacists of the district had worked heartily with the Executive in making preparations for the Conference, and he hoped that though the arrangements might have some imperfections they would be on the whole satisfactory, and that the visit to Newcastle would prove a great success.

Reception of Delegates.

Dr. Thresh (Honorary Secretary) then read the following list of delegates who had been appointed to attend the Conference on behalf of various Associations.

Pharmaceutical Society of Great Britain:—The President, Vice-President, Treasurer, Messrs. Allen, Atkins, Cross, Gostling, Leigh, Martindale, Newsholme, Schacht, Watt, and the Editor, Sub-Editor, and Secretary.

Pharmaceutical Society of Great Britain (North British Branch):—Messrs. W. Gilmour, D. B. Dott, Kinninmont, Maben, Nesbit, and J. Mackenzie.

Pharmaceutical Society of Ireland:—Messrs. G. D. Beggs and W. F. Wells, jun.

Aberdeen and North of Scotland Society of Chemists and Druggists:—Messrs. Broomhead, Giles, Johnston, Kay, and Paterson.

Birmingham and Midland Counties Chemists' Association:—Mr. Thomas Barclay.

Brighton Association of Pharmacy:—Messrs. Marshall Leigh and W. D. Savage.

Dundee Chemists' Association.—Messrs. Anderson, Kerr and Russell.

Hull Chemists' Association:—Messrs. C. B. Bell and W. H. Hammond.

Leeds Chemists' Association:—Messrs. F. W. Branson, P. Jefferson, R. Reynolds, Ward and Worfolk.

Leicester and Leicestershire Chemists' Association:—Mr. J. W. Clark.

Liverpool Chemists' Association:—Messrs. A. N. Samuel, A. C. Abraham, John Bain, M. Conroy, C. Symes and W. Wellings.

London Chemists' Assistants' Association:—Messrs. T. A. Ellwood, E. J. Millard, E. Richards and C. J. Strother.

Manchester Chemists' Association:—Messrs. T. B. Benger and G. S. Woolley.

Sunderland Chemists' Association:—Messrs. Askew, Fowler, Harrison, Mitchinson, Ranken, Todd and Turnbull.

Letters of apology and regret at not being able to be present had been received from Professor Bentley, Professor Attfield and Messrs. Bottle, Symes, Brunker (Dublin), T. Greenish, Stephenson, Davies (London), Wylie, C. Thomson, John Moss and Thomas Tyrer.

Report of the Executive.

Mr. Naylor (Hon. Sec.) next read the Report of the Executive Committee, as follows:—

Report of the Executive Committee.

Your Committee in presenting a summary of the business it has transacted during the year, is glad to be able to report that the numerical strength of the Conference has been more than maintained, and that there are not wanting signs of increased activity.

The results of the biennial whip issued two years ago having fallen short of the success it was expected to achieve, your Committee deemed it advisable to try some other mode of appeal. After much deliberation it was agreed that the best form the appeal could take would be that in which the personal element was prominent. It was ultimately resolved that the Honorary Secretaries should address, in due course, a communication to the Secretaries of the various Local Associations to which Year-Books are annually sent, requesting their co-operation in obtaining additional members. This resolution will be carried into effect at an early date, when it is hoped it will elicit a hearty and general response. In this connexion it may be usefully pointed out that the principle involved in this tentative scheme is not new, but one that commands only a too limited practice. Its application in the direction of securing nominations for membership is commended to every member of the Conference. It is a pleasure to your Committee to supplement the announcement made

last year of the resignation of Mr. A. H. Mason, F.C.S., as Honorary Secretary for Canada, by the further statement that Mr. Joseph Bemrose, F.C.S., of Montreal, Canada, has consented to act as his successor.

In order to assist willing workers in the choice of suitable subjects requiring investigation, the familiar Blue List has been subjected to a painstaking and extensive revision. It is gratifying to find that of the papers to be read at this meeting a not unimportant proportion afford proof of the indebtedness of the authors to the suggestions therein contained. That the number is not larger may be reasonably attributed to the shortness of the interval between its issue and the present gathering.

The absence during the year of any application for a money grant in aid of research is a subject of regret. Your Committee would improve the occasion by reminding capable contributors of its readiness to provide funds to assist in defraying the cost of materials connected with the conduct of original researches suitable for reports to Conference.

The Committee of the Unofficial Formulary has, through its Chairman, reported to the Executive Committee that the work it has in hand has not reached a sufficiently advanced stage to justify a recommendation for its publication this year.

The Honorary Treasurer of the Conference, with the sanction of your Committee, has effected a change in the consols of the Bell and Hill Fund, a step necessitated by the conversion scheme of the Government.

Mr. Louis Siebold, F.I.C., F.C.S., was last December reappointed Editor of the 'Year-Book.' The manuscript of Parts I., II., III. and IV. of the 1889 volume is now in the hands of the printers.

It is the painful duty of your Committee to report officially the death of Mr. John Williams. Five years ago he honoured our Association by his occupancy of the Presidential chair, and for three consecutive years he filled the office of President of the Pharmaceutical Society of Great Britain. To the latter body and the Conference he was a liberal contributor. Mr. Williams in his career supplied added proof of the possibility of a practical pharmacist being also a sound chemist. He was possessed of a kindliness of disposition, the depth of which only those could form an approximate estimate whose privilege it was to know him intimately, whilst he was also unobtrusively generous, a characteristic which induced him to impart freely knowledge which had taken him long years of patient toil to acquire.

The number of Notes and Papers which have been received for this meeting is larger than in any previous year since 1885. From the standpoints of usefulness and suitability they fulfil in an admirable degree the scientific requirements of the Conference. Among the contributors are to be found old friends whose productions are ever welcome, and these will join heartily in the congratulation due to the fact that several of the papers represent maiden presentations to the Conference, a circumstance which augurs well for its future.

The Reception last evening by the President and officers of the Conference and the Conversazione which followed may be pronounced not only a well-deserved but a brilliant success.

Your Committee cannot conclude its Report without a reference to the loss the Conference is about to sustain in the departure of its late senior honorary secretary to Melbourne, to undertake the responsible duties of Lecturer on Chemistry and Materia Medica in the College of Pharmacy, Melbourne, and Demonstrator of Pharmacy to the University of Melbourne. It congratulates Mr. Plowman on his appointment and elevation, and is assured that the best wishes of every member of this Conference will accompany him to his new sphere of labour. It also feels, in wishing him health and success, that he will do much by his presence and personal endeavour towards strengthening the attachment to this Conference of our fellow members in Victoria, which he successfully initiated five years ago.

Financial Statement.

Mr. Martindale (Hon. Treasurer) read the following Financial Statement:—

FINANCIAL STATEMENT FOR THE YEAR ENDING JUNE 30, 1889.

The Hon. Treasurer in Account with the British Pharmaceutical Conference.

July 1, 1888. *Dr.*	£	s.	d.	£	s.	d.
To Assets forward from last year—						
,, Balance in hand at Bank				105	0	3
,, Cash in Secretary's hands				2	9	6
,, Messrs. Churchill's Account				154	0	11
June 30, 1889.						
To Sale of Year-Book by Publishers				18	13	4
,, Advertisements, 1888 volume	107	7	11			
,, ,, 1887 ,,	1	16	0			
				109	3	11
,, Members' Subscriptions, Amount received for year ending July 1, 1888, to June 30, 1889				538	10	4
,, Index to Year-Book, sale by Secretary				1	10	0
,, Outstanding Liabilities, Messrs. McCorquodale and Co.				6	17	9
,, Unofficial Formulary, sale by Publishers				30	12	0
				£966	18	0

June 30, 1889. *Cr.*	£	s.	d.	£	s.	d.
By Expenses connected with Year-Book:—						
Printing, Binding, Publishing, etc.	280	6	9			
Postages and Distribution	24	8	9			
Advertising and Publishers' charges	30	13	0			
Editor's Salary	150	0	0			
Foreign Journals for Editor	5	15	6			
				491	4	0
,, Unofficial Formulary:—						
Printing and Binding	16	12	0			
Advertising and Postage	7	6	6			
Publisher's Commission	3	1	0			
				26	19	6
,, Sundry Expenses:—						
Grant to Formulary Committee	10	0	0			
Expenses of Assist. Sec. at Bath	10	0	0			
				20	0	0
,, Assist Sec.'s Salary from July 1, 1888, to June 30, 1889	40	0	0			
,, Rent of Office	10	0	0			
				50	0	0
,, Blue Lists	3	16	6			
Postages of	3	4	0			
				7	0	6
,, Postages				25	11	2
,, Printing and Stationery, from July 1, 1888, to June 30, 1889				14	18	9
,, Bank Charges, as per Bank Book				1	5	11
,, Petty Cash				5	2	9
,, Liabilities of last year, since paid—						
Messrs. Butler and Tanner	131	11	4			
,, McCorquodale and Co.	7	6	6			
				138	17	10
,, Outstanding Assets—Messrs. Churchill's Account				117	8	9
,, Balance at Bank	64	17	3			
,, Balance in Secretary's hands	*3	11	7			
				68	8	10
* For Postages, £1 4s. 10d.; Petty Cash, £2 6s. 9d.				£966	18	0

THE BELL AND HILLS FUND.

				£ s. d.	£ s. d.
1888.					
July 1.	Balance in hand			21 1 4	
Aug. 9.	Dividend on Consols, £350, due July 6, 1888			5 2 5	
1889.					
Jan. 14.	,, ,, ,,	July 6, 1889		5 2 5	
May 15.	,, ,, ,,	May 15, 1889		4 11 0	
1888.					35 17 2
Aug. 31.	By Purchase of Books from Kimpton for Bath			10 12 6	
1889.					
May 15.	To Sale of £350 3 per Cent. Consols		350 0 0		
May 29.	By Purchase of 2¾ per Cent. Consols		357 15 6		
	By Difference on Purchase			7 15 6	
					18 8 0
	Balance				£17 9 2
	Assets—				
	Cash—Balance at Bank				17 9 2
	Consols				360 0 0

Audited and found correct. Security (Consols, £360) viewed.
J. WILSON, 11, George Street, Bath,
T. RHEEDER, Newcastle-on-Tyne. } *Auditors.*

Mr. RHEEDER (Newcastle), one of the auditors, having testified to the correctness of the accounts and to the securities being all in order,

The PRESIDENT moved that the report of the Executive and the Balance Sheet be received and adopted.

Mr. C. B. ALLEN seconded the motion, which was at once agreed to.

The PRESIDENT then delivered the following address:—

THE PRESIDENT'S ADDRESS.

It was at Newcastle after the meeting of the British Association in 1863 that a few leading pharmacists met with the object of inaugurating an annual Pharmaceutical Conference.

At this first meeting the desirability of having at intervals an opportunity of conferring upon matters of interest and importance to pharmacists was shown, and it was thought that a stimulus to intellectual exertion would be given by the prospect of periodical gatherings, and that many who had time and opportunity for research would be induced to contribute papers, while the majority when associated would look forward to an annual gathering as an opportunity of good fellowship.

We are indebted to Schacht for the idea of our annual Conference; to Attfield, Brady and Reynolds for our excellent organization, and to the indefatigable Secretaries for the success of our annual meetings through a series of years.

Reference to the list of members who have been called to the Presidential chair reminds me not only of the honour you have done me in electing me to this office, but fills me with misgivings lest I should unworthily occupy the post which has been so ably filled by my predecessors.

It is to be regretted that death removed some of our Presidents while capable of active work, but gratifying to know that their labours live after them, and that their published researches are ornamental to our 'Year-Books of Pharmacy,' and of great practical value to medicine and commerce.

Presidents Deane, Hanbury, Stoddart, Southall and Williams took the greatest interest in this Conference, and other Presidents who are happily among us to-day, as well as those that are absent, are still in sympathy with this Association and its objects.

We who have seen the "blue ribbon" that it is customary for the Royal Society to confer on workers in science, given to some of our past Presidents, have reason to feel proud of the distinction conferred upon pharmacy through them.

Your late President, when speaking at Bath of the "silver wedding" of the Conference, had a most felicitous topic. I am fortunate in having what should prove an attractive occasion, one indeed which should enlist an enthusiasm equal to that of last year's meeting, arising out of the fact that it was in this very town twenty-six years ago that the British Pharmaceutical Conference had its birth.

> "Breathes there the man, with soul so dead,
> Who never to himself hath said,
> This is my own, my native land!"

The Conference as you are aware has met in many important cities and towns in England, Scotland and Ireland, and on this occasion we are responding to an invitation given twenty-six years ago, when Brady expressed his satisfaction that Newcastle had had the privilege of receiving the first meeting of the Conference, and promised a hearty welcome whenever its members were again disposed to visit his town.

Those good friends I see around me to-day evidently had not forgotten the past, and thus it was that at Bath their colleagues said, "that the heart of Newcastle beat with parental affection to the Conference," and, as if to remind us of the geographical position of their town, and to entice our North British friends to come over the border, they said—

> "Better loved ye canna be
> Will ye no come back again?"

The subjects upon which my predecessors have addressed you have been most varied. Some Presidents reviewed researches in those sciences having a direct bearing upon pharmacy which had been published during their year of office; others spoke to you upon pharmaceutical ethics and politics; some upon revision of the British Pharmacopœia; while others directed your attention to the study of some particular science upon which they spoke as experts.

In casting about for a topic upon which I might address you, I came to the conclusion that one of the articles of association of the British Pharmaceutical Conference agreed to in this town in 1863, viz., "*That one object of the Association should be to maintain uncompromisingly the principle of purity of medicine*," would not be an inappropriate theme on which one might say something concerning our every day life

that would lead to fresh lines of thought, and such a modelling of our ideas and actions that might tend to make us more accomplished pharmacists and not less successful men of business.

In the days when sophistication was rampant there were to be found a few at any rate who prized the judicious selection of substances for use in medicine. That the choice was not always used and approved by the physician is shown by the history of the conflicts between physician and apothecary as far back as the reign of Henry VIII., when physicians were empowered to "search, view and see the apothecaries wares, drugs and stuffs," and to destroy such as they found unfit for use. This power eventually passed from the hands of the physicians to the Society of Apothecaries, who separated themselves from the grocers with whom they were by charter incorporated, and against whom they made bitter complaints on account of the frauds that the latter would persist in practising.

To remedy this evil, in the year 1623 the Society of Apothecaries founded an institution for the purpose of making some of the most important preparations for the use of their own members, and although at first operations were on a small scale, being confined to the manufacture of a limited number of preparations, their products were gradually increased both in number and quantity, and eventually we find two centuries later this institution in the foremost rank as producers of medicines of a high standard of purity.

The medicinal compounds in vogue in the seventeenth century were chiefly empirical nostrums or mixtures of substances, some of which neutralized others, and compounding prescriptions and manufacturing medicines was carried on without any reference to scientific principles. While it is true that prior to the organization of the Society of Apothecaries, two editions of the London Pharmacopœia were published, still the science of chemistry had so little advanced that it was not until about the time of the tenth edition of the London Pharmacopœia that there was any real knowledge of manufacturing pharmacy.

The signs of the times were not without their lesson to some keen business men in the early part of this century; for it became obvious that traffic in drugs, whether in the condition as imported, powdered, or manufactured into galenicals, might in the future be more successfully carried on by due regard being paid to purity.

There was a new departure, and London wholesale druggists were not handicapped in their start, for their city was the drug market of the world, and the importation and sale of raw drugs had given them great experience and pecuniary profit. The dissatisfaction of the compounders of medicines no doubt gave rise to this new departure, for the continued complaints of the physician made them aware that for anything other than crude or garbled drugs, but little reliance could be placed in the wholesale druggist, and thus it was, notwithstanding mechanical applicances were vastly improved for pulverization and other processes, the dispenser had to produce his powders by pestle and mortar if the physician's prescriptions were to be reliably dispensed.

Now in those days it was the practice of the wholesale druggist to send his drugs to a drug miller, who, it is to be regretted, was not so scrupulous of the purity of his products as are the firms who carry on similar businesses to-day, and it is certain, moreover, that the wholesale druggist set a bad example to the miller, for it was not an uncommon practice (as I was once informed by a wholesale druggist who was in business at the end of last century) to send comparatively inert substances to the mill to be ground and mixed with potent drugs.

Early in this century guaranteed powdered drugs were introduced in trade by Thomas Herring, who claimed that his soft, impalpable, bright looking vegetable powders were as pure as the unsightly powders that compounders were then producing for themselves by pestle and mortar.

Others followed upon parallel lines with marked success, and the good example of several well-disposed men, striving for excellence, was one of the important steps which have been instrumental in producing the purity, uniformity and perfection so generally to be met with in the powdered drugs of to-day.

Compounded medicines at this period consisted largely of galenicals; and notwithstanding chemical substances were used in medicine, their preparation was imperfectly understood.

Chemical science, it is true, had already started on its triumphant march, for Phillips, when reviewing the Pharmacopœia of his time, wrote most ably thirty pages upon the preparations of antimony.

Tricks were resorted to in the adulteration of simple chemical substances which leave but little doubt that notwithstanding there was a want of chemical knowledge and manipulative skill, there was no lack of deliberate intention to defraud.

The success attendant upon the production of pure powdered drugs was an incentive to some of our historic houses, and it came about that not only were chemical substances prepared with due regard to their medicinal purity on a larger scale than heretofore, but organic novelties such as quinine, morphia, strychnia, which were now finding uses in medicine, were produced on a manufacturing scale of a purity, which, considering the chemical knowledge of the manipulators, was highly creditable.

For half a century prior to our first Conference a gradual but steady advance in the direction of purity for medicinal substances was made, and the pharmacists of 1863 did not fail to take cognizance of this; moreover, they saw that the sphere of their labours was being constantly enlarged, and if pharmacy in the future was in any way to be a credit then their work as chemists and pharmacologists must be unceasing.

Since the first Newcastle meeting the rival pharmacopœias of London, Edinburgh and Dublin have been fused into a national pharmacopœia. This has been advantageous in helping forward and maintaining uniformity and purity in medicine. Those of us who have been in harness during the publication and use of three or four pharmacopœias know the effect a well-revised edition has upon the commercial standard of crude and manufactured drugs. The British Pharmacopœia, 1885, is an excellent type of what such a

book should be, for it adopts a standard that ensures efficiency, and does not attempt to introduce rare and exceptional quality that is only occasionally obtainable to the exclusion of that which is to be had of uniform excellence without difficulty.

There is perhaps no work upon which an expert has to use his judgment with so much tact and skill, so that he may keep both in touch and tune with the medical profession, the pharmacist, the drug merchant and manufacturer, as when he is called upon to edit a national pharmacopœia. He may be misled by statements based on imperfect information, or defective manipulation, and he cannot in all cases obtain facilities for checking the accuracy of published results. The suitable editing of a pharmacopœia becomes apparent when the Editor, knowing the requirements of the medical profession and the capabilities of pharmacists and manufacturers, adopts standards and frames "characters and tests" which are acceptable to all concerned, and this without in any degree imperilling that principle which this Association has at heart, viz., to maintain without compromise the purity of medicine.

Pharmacists should do all in their power not only when in their own business premises, but also in their public and private capacities, etc., to impress upon the public that household remedies should invariably be purchased of a similar strength and quality to those medicines physicians direct to be used in compounding their prescriptions.

If pharmacists would thus aid in educating the public they would rid themselves of much outside competition in which weaker and inferior preparations are sold in lieu of the preparations of a higher standard vended by themselves; and this might be done quite apart from the question as to whether, legally, it is compulsory to retail British Pharmacopœia preparations or not.

Is it not also desirable that pharmacists should cooperate with the Medical Council in their desire to make the British Pharmacopœia preparations legal for sale, and those of old Pharmacopœias obsolete and illegal? In my opinion it is most desirable.

The Sale of Food and Drugs Act has materially aided in maintaining and advancing purity in medicine.

As a rule it is a thankless and almost hopeless task to make communities good by Act of Parliament, and oftentimes the striving of the few will act more beneficially as an incentive to the attainment of a higher standard than any coercion that can be devised. There is a residuum nevertheless holding either different or no definite views that prefers not to take action unless under compulsion.

This must have been true in reference to traffic in medicines in the past, or "Drugs" would not have been tacked on to the Sale of Food Act, and our business signalled out as one in which it was necessary that supervision should be exercised for the public good.

The working of this Act, in so far as it concerns the drug trade, has not been without friction, due in many cases to the imperfect knowledge of officials, but the novelty now having passed away and the superabundant zeal toned down to a reasonable pitch, only those cases are heard of which indicate fraud on the public. One often wonders when one reads of the number of samples of drugs that have been purchased for chemical examination, most of which seem to turn out satisfactorily judging from the absence of prosecutions, whether in all districts the analysts are so conversant with the characters and tests and commerce of drugs as to enable them to efficiently test substances submitted to them, or to advise the authorities when prosecutions should be unflinchingly carried out or not instituted.

The highly trained pharmacist has neither sought or obtained the post of Public Analyst in anything like the number of instances he should have done.

It may be that, notwithstanding his acquaintance with pharmacy, he lacks chemical and microscopical skill. If this be so, more complete instruction should be given in these subjects, and students should give themselves up to systematic instruction for a period of two or three years at least, otherwise they cannot expect to become competent to fill the post of Public Analyst. Possibly the clause in the Sale of Food and Drugs Act which provides that no person shall be appointed as analyst for any place who shall be engaged directly or indirectly in any trade or business connected with the sale of food or drugs in such place has prevented pharmacists from seeking the appointment, obviously they are at a disadvantage as compared with professional men under this regulation.

Surely there cannot be two opinions upon the desirability of impressing the public that the trained pharmacist is not on the same dead level as the traders with whom he is surrounded, and with whom in selling simple commodities he has unfortunately to compete.

Could any better indication of the superiority of his training, and a fitness for the confidence of the public be found than his appointment as Public Analyst?

The public is not slow in taking note, and would not fail to observe that similar appointments were held by medical practitioners, and such observation would in due course necessarily tend to the better recognition of the pharmacist as an educated man, for whose superior knowledge even in trading it would rather pay an extra fee, as compared with the drug grocer who had no information to part with.

It is none the less true now than it was at the commencement of this century, that in order to guarantee one's manufactures there is nothing compared with the simplicity of producing them for oneself.

The regulations with which the Excise have surrounded our manufactures, and which are unequalled in number and stringency in any country in Europe, have been thought necessary in the past in order that the duty upon alcohol may the more easily and accurately be collected. This impost has produced a depressing effect upon the manufacturing pharmacy of this country, which cannot have advanced either the purity of medicine, or our position commercially.

For England to have been compelled to purchase in the markets of Germany her alcoholic medicinal preparations, which the exigencies of her trade required should be exported in bond to her colonies and elsewhere, was most humiliating. We were more to blame

than those who continued this part of our fiscal system, inasmuch as we submitted to the yoke for years without complaining or moving in our own interest, and, as a matter of fact, until recently the authorities were not aware that the manufacturer of medicines had any grievances to be redressed.

Happily, within the past year, on account of the broader views prevailing, and the interest taken in our work by the practical men at the head of the Inland Revenue department, there has been an amendment, and the Excise regulations which so trammelled us in the past have now to some extent been removed, and at last there is an opportunity of producing most of our alcoholic medicinal preparations, with permission to export them under suitable drawbacks. These concessions will be of commercial value, and the manufacturing pharmacist will have an opportunity in the future of guaranteeing that his products are what they profess to be, and the standard of purity in medicine will thereby be legitimately maintained and advanced.

The Board of Inland Revenue has taken a good work in hand and it must not look back.

England produces chloroform, ether and other substances from alcohol without opportunity of competing with Germany and other countries, for the Excise take no account of the heavy pecuniary loss entailed in manufacturing such liquids from duty-paid alcohol, and give no rebate either for loss, or for duty, to the manufacturer on exportation.

Why England should be driven to Germany and elsewhere for so many of its alcohol derivatives, of which hydrate of chloral is an excellent type, and why alkaloids, as atropine, veratrine, aconitine, and a legion of other preparations should be imported to the detriment of our trade, and the demoralization of our rising chemists and pharmacists as manufacturers I cannot conceive.

In my opinion, alcohol free of duty for medicinal purposes, or some facility to work with pure alcohol under supervision, is a most serious and urgent necessity. We are surely all desirous that we may not continue mere purveyors of potent remedies, but that we may be producers also, with a complete knowledge of the products we handle, whether as dispensers or traders.

There should be no attempt in the direction of obtaining concessions from the Inland Revenue that are impracticable. The department has recently shown a desire to aid rather than to hamper our manufactures, and there must not now be permitted, even if it should be wished, any lethargy or retrograde movement. Did not Germany for years take tea (valueless for dietetic purposes) out of our bonded warehouses without paying duty, and extract caffeine therefrom, selling it to the world, England included? and has it not been from recent concessions of our Customs authorities that we (thanks to the agitation of a shrewd business man) are now in a position to manufacture caffeine as advantageously as our continental opponents?

The late President of the Chemical Section of the British Association referred at the Bath meeting to the decline of chemistry in this country. While I am not in a position to give an opinion on this subject, as a whole, I fully concur in Professor Tilden's views in so far as the study of chemistry and its application to the manufacture of substances for use in medicine is concerned.

If one seeks the reason why in medicine this has come about, when a generation ago England was quite abreast of other nations in the production of inorganic and even organic medicinal substances, one can only come to the conclusion that something must have militated against advancement.

In my opinion two causes at least have been at work, viz., the stringent regulations with which we have been hemmed in by the Excise and the meagre opportunities of education in research that have, up to a very recent date, been afforded in this country.

Our historic drug houses, who have always acted more or less as manufacturers, have, much to their own detriment, neglected research. Each establishment should have had its chemist engaged in the chemical examination of new remedies for the discovery of active principles, etc., which must have tended to have kept us out of the arms of foreigners for most of our alkaloids and other organic substances now in such increasing demand in medicine.

Manufacturers may state that had men educated for such purposes been forthcoming, they would have gladly embarked capital, with the objects of research and manufacture in view, rather than have remained apathetic; and to some extent this is true. In the future, however, such an excuse ought not to hold good, inasmuch as the Pharmaceutical Society has at a considerable cost equipped a research laboratory, which should before this century closes produce many men competent to undertake research and manufacture.

There should be no lack of students in the Society's research laboratory; applications should outnumber vacancies, and men when trained need have but little fear of a demand for their skilled labour.

The Pharmaceutical Society has not unlimited funds, and its moneys cannot all be spent to aid research, but "ways and means" would be no barrier if men were forthcoming.

Let this laboratory be in such demand that there be no vacancies, and the research of such a nature as to be of benefit to medicine and pharmacy, and I have but little doubt that the good friends who honour us by delivering annual addresses to our students, and who hold positions in the House of Commons, our universities and elsewhere, would co-operate to obtain pecuniary aid in furtherance of our object, and it is not at all likely that our rich city companies, who do so much for education, endow scholarships and vote funds for special researches connected with medicine and surgery would stand aloof.

One would imagine, if one did not know to the contrary, that we were all agreed upon the desirability of a good scholastic and scientific education, backed by business training for those who practise pharmacy. In my opinion no simpler method can be devised in aiding pharmacists as a body to maintain the excellent principles of this Association, as this thorough training, accompanied by the higher education of some in its ranks in research.

It is quite certain that the pioneers of the British Pharmaceutical Conference had not two opinions on this point, and while it is true that few of the black clouds which threaten us as a trade to-day had gathered in their time, still the path is now, as then, in the direction of education, and I hold that our juniors must have every facility for such a training and thorough education in all those sciences having a direct bearing on pharmacy, as will enable them to take up their proper position with the medical profession and the public.

It was not required of the men who met at Newcastle, in 1863, that they should prove their qualification by the possession of the Pharmaceutical Society's diploma. In those days there were no compulsory examinations, as you are aware.

Examinations are not an unmixed blessing, subject as they are to no inconsiderable abuse, and the craze to pass examinations against time has created a state of things which may in the end prove anything but a boon to the pharmaceutical body of the future. It is to be feared that if the students of to-day were asked why they studied, that by far the larger proportion would be bound to acknowledge that they were only occupied in cramming into themselves in the most rapid and easy fashion the minimum amount of information that would help them to pass their examinations.

One cannot help regretfully remarking upon this abuse of education, and the failure of the majority to thirst after knowledge for its own sake.

When one reminds the average modern student that "knowledge is power," he seems sceptical, and often replies that the information obtained in pharmacy is much too narrow in its scope to lead to reward, and he invariably treats with indifference statements that may be made in reference to the influence that applied chemical and botanical knowledge has upon the world's commerce. He fails to grasp the lessons that are to be found on all sides, and only the thoughtful few are impressed when one gives palpable examples, with the object of proving the marvellous effect science has upon commerce.

The pharmacists of Newcastle can point with sorrow to a vast industry of the Tyne which has been partially dislodged and well nigh ruined, solely as a result of applied chemical knowledge. I refer to the manufacture of alkali by the Leblanc method and its present production by the ammonia process.

Since the time also when the Conference held its first meeting in this town, and at which period our supplies of cinchona were drawn almost wholly from the South American Continent, what a change has come about.

Who could have thought when botanists and planters experimented in Ceylon, the Nilgiris and Java, that in less than one short generation we, who at one time contemplated a cinchona famine, should now be constantly heard to say, "Hold—enough?"

Are not these good illustrations of the working of science? Examples might be multiplied and men named to show that the able pharmacologist can leave footprints that extend not only to medicine, but also to commerce.

Did not Daniel Hanbury make an indelible mark? Those who knew this past President of our Association are aware that 'Pharmacographia,' compiled, as it was, after years of laborious research (looked upon as a labour of love), has been not only a boon and a guide to students of materia medica, but a material help to those who grow, collect, ship or import drugs; few publications have done more to aid that one object of this Association, viz., the maintenance of the purity of medicine, than this work of Hanbury and Flückiger.

I regret my inability to address you upon topics with which you as dispensers of medicine are more immediately concerned; but as several of my predecessors have done this most ably, and as I from the nature of my business am only imperfectly acquainted with this aspect of pharmacy, I trust that this reference will be accepted as an apology for not having followed the beaten track.

I have passed in rapid review a few of the leading features connected with the purity of medicine during this century, and in my divergence to matters connected with or around the subject I have endeavoured to show what has been done spontaneously, and under coercion, and from force of good example, together with the commercial results of applied botanical and chemical knowledge.

Nothwithstanding the divergence of the various paths over which pharmacy has been trodden during the last three quarters of a century, most of the roads have finally led to one goal, around which there is one of the fairest portions specially and attractively laid out for the maintenance of the purity of medicine. We who are assembled on this pleasant and reputable spot to-day have gained more speedy access than we should otherwise have done, had not steps on easy paths been thoughtfully hewn for us.

Let us not "rest and be thankful" for the small advance we have made, but rather use our position as a ledge upon which we may firmly plant ourselves, with a determination to advance to heights which, without our present vantage ground, would have been inaccessible, and may we zealously toil to so maintain and advance pharmacy as to be worthy of those who at Newcastle twenty-six years ago founded the British Pharmaceutical Conference.

Mr. ATKINS (Salisbury) proposed a cordial vote of thanks to the President for the admirable, thoughtful and instructive address he had delivered. It was highly important on the historic occasion of the revisit to Newcastle that there should be a President worthy of the occasion, and though he could have said more on this point in the absence of Mr. Umney, he might say that he regarded him as a typical, ideal pharmacist; a man who had a broad sweep of his subject, with a good knowledge of detail; a chemist, a pharmacist, a man of business, and a man of boundless energy; and possessing these qualities he need not say how confident all who knew the history of the Conference were, that its traditions would be safe in his hands. As an early student of the Pharmaceutical Society Mr. Umney had done work in its laboratories, museums, evening meetings, and literature, which had been of the greatest value, and coming to the practical side of life, in that direction also they were much indebted to him. In the concessions obtained from the Inland Revenue for the use of spirit for export he had done great service; and also in the Drug Committee of the London Chamber of Commerce with reference to the new Railway Rates Bill. With reference to the

address itself, and the variety of topics which it treated, the thoughtful *résumé* of the past and the investigation of the present aspect of science, education, and commerce, he thought they could not do better than thoughtfully peruse it and well weigh its suggestions. To the young men who were so largely represented that morning it would be an incentive to follow in the steps laid down, and to the seniors it would be a subject of constant refreshment in perusal.

Mr. T. M. CLAGUE esteemed it a great honour to be allowed as Local Secretary to second the proposition. As practical north countrymen they were all very glad to have just the very man they wanted for President. Although a chemist of very considerable ability and a pharmacist who had laid them under great obligations, Mr. Umney was also a first rate man of business, and the assistance he had given to the manufacturers of pharmaceuticals in the matter to which a brief reference was made in the address—only leaving his own efforts out of sight—was of great value. He had recently come across a curious and interesting fact. As they had already heard, the Conference was established in Newcastle in the year 1863, and he found that in the same year Michael Carteighe and Charles Umney were bracketted together as prizemen at Bloomsbury Square. Since then, Mr. Umney had never slackened rein, but had gone on from year to year doing good work in pharmacy. All north countrymen were glad to see him in the Presidential chair, and to thank him for the earnest, practical, and sensible address with which he had inaugurated the session.

Mr. BRADY as Senior Vice-President put the motion, which was carried by acclamation.

(*To be continued.*)

The British Association for the Advancement of Science.

FIFTY-EIGHTH ANNUAL MEETING.

The fifty-eighth annual meeting of the above Association commenced on Wednesday, September 11, at Newcastle-upon-Tyne, under the presidency of Professor W. H. Flower, C.B., LL.D., F.R.S., F.R.C.S., Pres.Z.S., F.L.S., F.G.S.

THE PRESIDENT'S ADDRESS.

It is twenty-six years since this Association met in Newcastle-upon-Tyne. It had then the advantage of being presided over by one of the most distinguished and popular of your fellow-townsmen.

Considering the age usually attained by those upon whom the honour of the presidency falls, and the length of time which elapses before the Association repeats its visit, it must have rarely happened that any one who has held the office is spared, not only to be present at another meeting in the town in which he has presided, but also to take such an active part in securing its success, and to extend such a hospitable welcome to his successor, as Lord Armstrong has done upon the present occasion.

The address which was delivered at that meeting must have been full of interest to the great majority of those present. It treated of many subjects more or less familiar and important to the dwellers in this part of the world, and it treated them with the hand of a master, a combination which always secures the attention of an audience.

When it came to my knowledge that in the selection of the President for this meeting the choice had fallen upon me, I was filled with apprehension. There was nothing in my previous occupations or studies from which I felt that I could evolve anything in special sympathy with what is universally recognized as the prevailing genius of this district. I was, however, somewhat reassured when reminded that in the regular rotation by which the equal representation in the presidential office of the different branches of science included in the Association is secured, the turn had come round for some one connected with biological subjects to occupy the chair, which during the past seven years has been filled with such distinction by engineers, chemists, physicists, mathematicians, and geologists. I was also reminded that the Association, though of necessity holding its meeting in some definite locality, was by no means local in its character, but that its sphere was co-extensive, not with the United Kingdom only, but with the whole of the British Dominions, and that our proceedings are followed with interest wherever our language is understood—I may say, throughout the civilized world. Furthermore, although its great manufacturing industries, the eminence of its citizens for their skill and intelligence in the practical application of mechanical sciences, and the interesting and important geological features of its vicinity, have conferred such fame on Newcastle as almost to have overshadowed its other claim to distinction in connection with science, this neighbourhood is also associated with Bewick, with Johnson, with Alder, Embleton, Hutton, Atthey, Norman, the two Hancocks, the two Bradys, and other names honoured in the annals of biology; it has long maintained a school of medicine of great repute; and there has lately been established here a natural history museum, which in some of its features is a model for institutions of the kind, and which, I trust, will be a means of encouraging in this town some of the objects the Association was designed to promote.

There can be no doubt that among the various methods by which the aims of the British Association (as expressed in its full title, the *advancement of science*) may be brought about, the collection and preservation of objects available for examination, study, and reference—in fact, the formation of what are now called "museums"—is one of very great practical importance; so much so, indeed, that it seems to me one to the consideration of which it is desirable to devote some time upon such an occasion as this. It is a subject still little understood, though, fortunately, beginning to attract attention. It has already been brought before the notice of the Association, both in presidential and sectional addresses. A committee of our members is at the present time engaged in collecting evidence upon it, and has issued some valuable reports. During the present year an association of curators and others interested in museums has been founded for the purpose of interchange of ideas upon the organization and management of these institutions. It is a subject, moreover, if I may be allowed to mention a personal reason for bringing it forward this evening, which has more than any other occupied my time and my attention almost from the earliest period of my recollection, and I think you will agree with the opinion of one of my distinguished predecessors in this chair, "that the holder of this office will generally do better by giving utterance to what has already become part of his own thought than by gathering matter outside of its habitual range for the special occasion. For," continued Mr. Spottiswoode, "the interest (if any) of an address consists not so much in the multitude of things therein brought forward as in the individuality of the mode in which they are treated."

The first recorded institution which bore the name of museum, or temple or haunt of the Muses, was that founded by Ptolemy Soter at Alexandria about 300 B.C.; but this was not a museum in our sense of the word, but rather, in accordance with its etymology, a place appropriated to the cultivation of learning, or which was frequented by a society or academy of learned

men devoting themselves to philosophical studies and the improvement of knowledge.

Although certain great monarchs, as Solomon of Jerusalem and Augustus of Rome, displayed their taste and their magnificence by assembling together in their palaces curious objects brought from distant parts of the world—although it is said that the liberality of Philip and Alexander supplied Aristotle with abundant materials for his researches—of the existence of any permanent or public collections of natural objects among the ancients there is no record. Perhaps the nearest approach to such collections may be found in the preservation of remarkable specimens, sometimes associated with superstitious veneration, sometimes with strange legendary stories, in the buildings devoted to religious worship. The skins of the gorillas brought by the navigator Hanno from the West Coast of Africa, and hung up in the middle at Carthage, afford a well-known instance.

With the revival of learning in the Middle Ages, the collecting instinct, inborn in so many persons of various nations and periods of history, but so long in complete abeyance, sprang into existence with considerable vigour, and a museum, now meaning a collection of miscellaneous objects, antiquities as well as natural curiosities, often associated with a gallery of sculpture and painting, became a fashionable appendage to the establishment of many wealthy persons of superior culture.

All the earliest collections, comparable to what we call museums, were formed by and maintained at the expense of private individuals; sometimes physicians, whose studies naturally led them to a taste for biological science; often great merchant princes, whose trading connections afforded opportunities for bringing together things that were considered curious from foreign lands; or ruling monarchs in their private capacity. In every case they were maintained mainly for the gratification of the possessor or his personal friends, and rarely, if ever, associated with any systematic teaching or public benefit.

One of the earliest known printed catalogues of such a museum is that of Samuel Quickelberg, a physician of Amsterdam, published in 1565 in Munich. In the same year Conrad Gesner published a catalogue of the collection of Johann Kentmann, a physician of Torgau, in Saxony, consisting of about 1600 objects, chiefly minerals, shells and marine animals. Very soon afterwards we find the Emperor Rudolph II. of Germany busily accumulating treasures which constituted the foundations of the present magnificent museums by which the Austrian capital is distinguished.

In England the earliest important collectors of miscellaneous objects were the two John Tradescants, father and son, the latter of whom published, in 1656, a little work called 'Musæum Tradescantianum; or a Collection of Rarities Preserved at South Lambeth, neer London.' The wonderful variety and incongruous juxtaposition of the objects contained in this collection make the catalogue very amusing reading. Under the first division, devoted to "Some Kindes of Birds, their Egges, Beaks, Feathers, Clawes and Spurres," we find "Divers sorts of Egges from Turkie, one given for a Dragon's Egge," "Easter Egges of the Patriarch of Jerusalem;" "Two Feathers of the Phœnix Tayle;" "The Claw of the bird Rock, who, as Authors report, is able to trusse an Elephant." Among "whole birds" is the famous "Dodar from the Island Mauritius; it is not able to flie, being so big." This is the identical specimen, the head and foot of which has passed through the Ashmolean into the University Museum of Oxford; but we know not what has become of the claw of the rock, the phœnix tayle, and the dragon's egg. Time does not allow me to mention the wonderful things which occur under the head of "Garments, Vestures, Habits and Ornaments," or the "Mechanick, Artificial Workes in Carvings, Turnings, Sowings and Paintings," from Edward the Confessor's knit gloves, and the famous "Pohatan, King of Virginia's habit, all embroidered with shells or Roanoke," also still at Oxford, and lately figured and described by Mr. E. B. Tylor, to the "Cherry-stone, upon one side S. George and the Dragon, perfectly cut, and on the other side 88 Emperours' faces;" or the other "cherry-stone, holding ten dozen of tortois-shell combs made by Edward Gibbons." But before leaving these private collections I cannot forbear mentioning, as an example of the great aid they often were in advancing science, the indebtedness of Linnæus in his early studies to the valuable zoological museums, which it was one of the ruling passions of several kings and queens of Sweden to bring together.

Upon the association of individuals together into societies to promote the advancement of knowledge, these bodies in their corporate capacity frequently made the formation of a museum part of their function. The earliest instance of this in our country was the museum of the Royal Society in Crane Court, of which an illustrated catalogue was published by Dr. Grew in 1681.

The idea that the maintenance of a museum was a portion of the public duty of the State or of any municipal institution had, however, nowhere entered into the mind of man at the beginning of the last century. Even the great teaching bodies, the Universities, were slow in acquiring collections; but it must be recollected that the subjects considered most essential to the education they then professed to give were not those which needed illustration from the objects which can be brought together in a museum. The Italian Universities, where anatomy was taught as a science earlier and more thoroughly than anywhere else in Europe, soon found the desirability of keeping collections of preserved specimens, and the art of preparing them attained a high degree of excellence at Padua and Bologna two centuries ago. But these were generally the private property of the professors, as were nearly all the collections used to illustrate the teaching of anatomy and pathology in our country within the memory of many now living.

Notwithstanding the multiplication of public museums during the present century, and the greater resources and advantages which many of these possess, which private collectors cannot command, the spirit of accumulation in individuals has happily not passed away, although usually directed into rather different channels than formerly. The general museums or miscellaneous collections of old are now left to governments and institutions which afford greater guarantee of their permanence and public utility, while admirable service is done to science by those private persons with leisure and means who, devoting themselves to some special subject, amass the materials by which its study can be pursued in detail either by themselves or by those they know to be qualified to do so; which collections, if they fulfil their most appropriate destiny, ultimately become incorporated, by gift or purchase, in one or other of the public museums, and then serve as permanent factors in the education of the nation, or rather of the world.

(*To be continued.*)

ANSWERS TO CORRESPONDENTS.

Telephone.—We must refer you to the advertisement pages. We cannot undertake to recommend particular houses.

Inquirer.—The compound is stated to have been prepared synthetically, but we have not seen any information as to how this has been effected.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Fairburn, Robinson, Welborn, Tharratt, Gorfeet, Beck, Fann, Smith, Wright, Alcock.

BOTANY BAY OR EUCALYPTUS KINO.

BY J. H. MAIDEN, F.L.S., F.C.S., ETC.,
Curator of the Technological Museum of New South Wales, Sydney.

1. Commerce and Uses of Eucalyptus Kinos.

Kinos are the most important exudations yielded by Australian indigenous trees. They are exceedingly abundant, and in the future, when they shall have been discriminated and put to a fair trial, they will be found to be the most valuable of all. There is no reason at all why the freshly exuded kinos of certain specified eucalypts should not drive that of *Pterocarpus Marsupium* and other species out of the market. The world's demand for kino for medicinal purposes is, however, not very large, and the use of this substance for tanning and dyeing is but in its infancy. Extracts for these latter purposes being made with water, the "gummy" kinos which are not available for tinctures may be utilized, and the very gum they contain is an advantage. Tanners are at their wit's end to obtain new astringent substances, and the industry I have indicated is capable of indefinite expansion. It does seem a waste of a colony's resources that thousands of tons of a valuable commodity should be allowed to be washed off the trees, simply because no attempt is made to create and foster markets for it. In India, kino-getters pay a tax to enter Government forests to ply their calling, and the time will come when a tax on the gatherers of eucalyptus kino on Crown lands will form no insignificant item in the revenues of the colonial governments.

In Australia, kinos are largely used in rural medicine, on account of their astringent properties, aqueous solutions being almost invariably made. Some of them are used by the settlers for ink, or for staining leather black, the process simply consisting in boiling the kino in an iron saucepan.

The expert appointed to examine the gums and resins at the Colonial and Indian Exhibition suggested the use of kinos for staining wood, and at the same time varnishing it, but they would be useless for varnishing, as they are all more or less soluble in water.

The commerce with Europe and America in eucalyptus kino has never been important, for the reasons given below. Soon after the foundation of New South Wales, a quantity was sent to England, but Mr. Redwood (*Pharm. Journ.*, vol. 1), speaking in 1841, stated that "Botany Bay kino appeared not to be at that time introduced into the English market, and Dr. A. T. Thomson says he has been informed that little of it has been brought to this country since 1802." Kino deteriorates on keeping, and if inquiries for it were met with supplies which had been in stock for years, it is no wonder that it would be reported as an inferior substance. The subject will be again referred to under "Gelatinization of Tincture of Kino."

Since 1840 the use of eucalyptus kino has been somewhat spasmodic. It is chiefly alluded to in pharmaceutical journals in connection with this subject of gelatinization, and on this account there is certainly a prejudice amongst English pharmacists which I hope these notes will help to remove. That pharmacists are willing to give eucalyptus kino a fair trial, is evident from the favour with which a good kino, of uniform composition, like that guaranteed by Mr. Bosisto to be from *E. rostrata*, is being received. It is gathered by men who know this species when they see it, and not by kino collectors, who, from sheer ignorance, mix half a dozen kinos, externally much alike, but very different in composition, in the same parcel.

It may be asked how, since there is so much similarity amongst eucalyptus trees and kinos, may those which are suitable be ascertained by the unscientific dweller in the country? I reply, by adopting the same precautions which would be used if the substance were of mineral origin. No man in his senses would begin to place on the market large quantities of stone without the preliminary assay to learn whether it would be payable or not. With a little practice, country people soon learn to distinguish, by peculiarities of bark, habit, place of growth, colour and quality of timber, the eucalypts in their neighbourhood, which of them yield kino, and how abundantly. Then an assay should be made of each kino. Any intelligent man will be able to apply the simple water and spirit tests referred to below, and thus ascertain whether it would probably pay to place the kino on the market. If an analysis be required the expense would be trifling. Then if care be taken to keep together the products of each species, the first step towards securing uniform kinos would have been achieved, and a market would inevitably follow.

2. Collection of Eucalyptus Kinos.

Pereira ('Vegetable Materia Medica') states that Botany Bay kino appears to be a kind of extract. It is, however, a perfectly natural exudation, and the supply is obtained by picking it from the trees. Heat is never employed. While wounding the bark stimulates the flow in some cases, I have never heard of such a practice being systematically resorted to, as in most districts the kino is abundant enough, and obtainable for the picking.

Usually it is collected from the outside, which accounts for its occasional admixture with particles of bark, but sometimes it is contained between the concentric layers of the wood (chiefly in the case of *E. corymbosa*). In the latter case it has communication with the outside of the tree, though frequently the passage is blocked with indurated kino, which has to be removed to enable the store inside to be drawn off.

Kinos should be gathered from the trees as fresh as possible, firstly, because they are so soluble in water that they are washed away in part by the rain, and secondly, the action of the sun and air contribute to alteration of their chemical composition, by which that portion not washed away tends to become black, and almost insoluble. This is mainly because of the conversion of the tannic acid they contain into phlobaphenes, and in the case of those which contain arabin, this tendency to insolubility is probably somewhat enhanced by the partial conversion of that substance into metarabin.

On account of the alteration which exposure to the atmosphere works in kinos, it is necessary to present several analyses of a species, if possible, in order that some idea of the composition of a particular kino may be obtained. It is obvious that the proportions of various constituents are not fixed quantities; in order to enhance the value of an analysis it is therefore most desirable, and even absolutely necessary, to give all particulars as to age of tree, date of collection, locality, approximate

date of analysis, physical description of kino, etc., in order that one kino may be compared with another. Of all the analyses or partial analyses of kinos by different experimenters, to which the author has access, of not one solitary sample are these necessary particulars given.

Because of the difficulty of diagnosing most eucalypts, herbarium specimens should also be collected, wherever possible.

3. Use of the Word "Gum" or "Gum-Tree" in Australia.

The arboreal vegetation of Australia consists, as is well known, mainly of species of *Eucalyptus*, and an almost universal appellation of these trees (and sometimes the few species of the closely allied genus *Angophora* are included), is "gum trees." This is because they usually yield kinos, which to ordinary people in Australia are known as gums. Some botanists, and, it is to be regretted, some chemists, have made matters worse by alluding to them as resins or gum-resins. The first name is erroneous, and the second can only be applied say to *E. maculata*, and not to it in strictness.

There are, however, certain gum-trees which from the structure of their bark are called "Ironbarks" and "Stringybarks," and in regard to the true ironbarks and the true stringybarks (for there are many gradations of bark), the term gum is very rarely applied, except in a generic sense. Further, in order to discriminate locally between the various "gums," various species go under the name of "red gum," "white gum," "blue gum," etc.; in fact the adjectives are very numerous. But two circumstances tend to complicate matters. The first is that the adjective is in one district employed to describe the leaves, in another the bark, and so on. Thus a "white gum" may be intended to denote a tree with white leaves, white bark, etc. The second is that the same species varies more or less according to climate, soil, aspect, etc., and the term "white gum," which might in some way describe a species in one district, would be totally inapplicable in another. Again, the same tree strikes people from different points of view, and a host of names for one tree sometimes stand current in the same district. I do not intend to pursue the subject further here, and would only say that the names exist and persist, and we must make the best of them. They are utterly bewildering to a stranger, or a beginner, but with experience and caution, they may become, in time, a help to the botanist.

I have written with this detail to emphasize the fact that the adjectives denoting colour apply to the tree as a whole, to its general aspect, and are in no way intended to be descriptive of so comparatively minute a portion of the bulk of the tree as the kino ("gum"). Otherwise, since nearly all kinos are red, they should nearly all be called "red-gums," the few exceptions being yellowish. To emphasize the point, no kinos ("gums") are blue, white, grey, etc., and yet we have blue gums, etc., by the dozen.

To show that the above exposition is not superfluous, I have only to refer to a statement of Wiesner's which is in these words, "Bentham and Mueller give two different gums from the same tree, viz.:—A grey gum, very likely the true gum-resin, and a red gum, which no doubt is a species of kino." Pretty well all the colours of the rainbow are applied in different parts to some particular species, and the very pardonable error into which Wiesner has fallen is common enough in the colonies themselves.

(*To be concluded.*)

DISCOVERY OF URANIUM IN CORNWALL.

The discovery in Cornwall of a continuous vein of uranium is an event of more importance to the fortunate finders than to the world at large. For, though not without its uses, this once rare metal is not indispensable in the Arts. What might have happened had it originally been cheap enough for the purposes of the great industries, it is difficult to say. But for a century it has occurred so seldom, and then only in pockets or patches, that the current price has been something like twenty-four hundred pounds per ton. It will be understood, then, that although a good deal cheaper than either gold or silver, uranium is still valuable enough to render the ownership of a "true fissure vein" a position to be regarded with something like envy even by a reef-miner in Grass Valley, or by the millionaire who measures his wealth by "feet" on the Comstock Lode. In appearance, uranium is of a steel-white colour, and hitherto it has been extracted very sparingly from various ores. Of these, the only one which is practically available as a raw material is pitch-blende, the "uranpecherz" of the German miners. This mineral is found, associated with lead and silver ores, in various parts of the world, especially in Bohemia, Saxony, and Hungary, in Connecticut, and in the Tincroft and Tol Carne Mines of Redruth, in Cornwall, where it occurs in the shape of greenish or brown-black masses clustering together like grapes. This pitch-blende is, however, almost invariably associated with a host of sulphides, arsenides, and other foreign metallic compounds, so that its extraction is necessarily a troublesome and expensive process. It is, therefore, curious that just one hundred years after Klaproth succeeded in isolating it under a name suggested by the newly-discovered planet Uranus, a lode of unprecedented promise should have been discovered at the Union Mine, Grampound Road, Cornwall. Here the ore, instead of being scattered in "pockets," fills a vein of more or less uniform breadth throughout the "country rock." How continuous it may be it is impossible to predict. But already the prospects are so good that several tons of ore have been banked, the assays reading as high as 12 per cent. of the pure metal, and, in some specimens, running up to 30 per cent. It is true that in Bohemia very rich samples have been known to yield 80 per cent., but this was in exceptional cases and in minute quantities, and should the new Cornish lode not run out, the fresh supplies may enable metallurgists to follow up some interesting experiments, which have previously been hampered, not so much by the cost as by the comparative scarcity of the metal.

The various oxides of uranium have long been employed in the Arts, more particularly in porcelain painting. Thus, uranic oxide imparts a beautiful golden or greenish-yellow hue to glass, while uranous oxide is used in producing the highly-valued black porcelain. In photography, various uranium compounds are in demand as substitutes for the still more costly chloride of gold, and as it forms with platinum and copper two alloys, each having the appearance of the most precious of all the metals, and, in one instance at least, capable of resisting the action of acids, it has been tried with perfect success as a cheap substitute for gold in electro-plating. Finally—and perhaps still more important—as uranium offers a high electrical resistance, it will, doubtless, when available in sufficient quantities, be eagerly seized upon as a useful aid in the electrician's work.—*Standard.*

The Pharmaceutical Journal,

SATURDAY, SEPTEMBER 21, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

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THE BRITISH ASSOCIATION.

THE length to which our report of the proceedings at the meeting of the British Pharmaceutical Conference extended last week, prevented more than a brief reference to the meeting of the British Association, which immediately followed it in the same town. This latter meeting also is now over, having proved fairly successful. The attendance reached 2436, which was in excess of that at Bath last year, and was almost identical with that at the previous meeting of the Association to Newcastle-upon-Tyne twenty-six years ago. This year the members were not tickled with the excitement of rival talking machines, neither was one subject so predominant, as electricity was last year, as to definitely characterize the meeting. But nevertheless the papers read in most of the sections seem to have been at least of average merit, and in the Chemical Section there were again discussions on the important questions of the nature of solutions and the teaching of chemistry. In the Presidential Addresses one noticeable feature was the extent to which reference was made to subjects that may be said to come fairly within the ken of the trained pharmacist. Professor FLOWER, somewhat unexpectedly, did not choose for his principal topic the science upon which he built up his reputation, but he nevertheless took one in respect to which he has had vast experience, namely, the arrangement of museums. This address, in accordance with our usual custom, has been reproduced *in extenso*, and need not be further referred to here.

In the Mathematical and Physical Section (A.), Captain ABNEY, prompted by the fact that this year is the jubilee of the practical introduction of photography by DAGUERRE and FOX TALBOT, took for the theme of his presidential address the effect of light on matter. Captain ABNEY'S enthusiasm for his subject is well known, but there is a *soupçon* of the "nothing like leather" sentiment in the assertion that there should be no stimulus to the study of science like the practice of photography, since chemistry, optics and mathematics are all required to enable it to be studied as it should be studied. Alas! here lies the crux, and Captain ABNEY confesses that the facts are against his theory, for that out of the twenty-five thousand people who take photographs, scarcely one per cent. of them know or care the why or the wherefore of the processes they practice. The address was an extremely interesting and instructive discussion of the action of light on silver salts and kindred topics, and incidentally an opinion was expressed upon a subject of considerable dispute, the possibility of photography in natural colours. To a certain extent Captain ABNEY says, this is not only possible, but has been effected; but the production of a negative in natural colours from which prints in natural colours might be produced appears to him to be impossible.

The choice by Sir LOWTHIAN BELL, the President of the Chemical Section (B.), of the metallurgy of iron as a subject fitted to illustrate the aid which chemical science is able to afford to the progress of a great industry, was no doubt influenced by the speaker's intimate acquaintance with the details of the services rendered by the chemist to the ironmaster. Sir LOWTHIAN concedes the value of the work done by those engaged in the manufacture of iron during the first half of the present century, which sufficed, without much thought being given to the laws of nature upon which the processes followed depended, to place the world in possession of iron in such abundance and at so low a cost that no engineering works were delayed during that period through deficiency of this material. On the other hand he claims that as a consequence of the ironmasters having since allied themselves with the chemists they have made more progress in thirty years than their predecessors did in three centuries. To mention one instance only, though an important one, among the many quoted, it is difficult to realize that only thirty-three years have elapsed since HENRY BESSEMER'S paper on "a mode of making iron without the use of fuel" was received by the British Association with such incredulity that a record of the title alone was all the notice accorded to it in the official volume of "Transactions" for 1856. Nevertheless, the development of the process therein described has within that short interval revolutionized the iron industry, and to-day places abundance of steel at the disposal of the engineer at lower cost than was formerly incurred in the use of iron. Before concluding his address Sir LOWTHIAN BELL referred to the subject of scientific and technical education in terms not quite in accordance with ideas prevalent in some quarters. Whilst admitting that British manufacturers no longer stand so far above those of other lands as they formerly did he maintained that in this result differences of education are in no way concerned. As to the technical side of the subject if it meant a system by which, along with some scientific instruction, manual dexterity in the use of tools, or a practical knowledge of manufacturing processes had to

be acquired, he was not sanguine as to the results. He did not object to the rudiments of science being taught wherever possible, and he admitted that the knowledge so obtained might often give the future workman a more intelligent interest in his employment than he at present possesses ; but he thought that those who expect much good to attend the putting on of such a thin veneer of chemistry or physics do not take sufficient account of the knowledge possessed by more highly educated men now directing the workshops of the world.

In the Geological Section (C.) Professor GEIKIE discoursed upon the results obtained during the last few years by continental workers in the domain of glacial geology. The Biological Section (D.) was debarred from the presence of its appointed president, Professor BURDON SANDERSON, through illness, but he nevertheless contributed a profoundly interesting address on the present position of biological science. In this communication it was shown that the method of research based on the correlation of function with structure, on the principle that every appreciable difference of structure corresponds to a difference of function, has for the present at least been exhausted, a point having been reached where functional differences are observed with no apparent structural differences to explain them. The biological problems therefore which at present most urgently demand solution are held to be those that relate to the endowments of apparently structureless living matter. The address to the Geographical Section (E), by Sir FRANCIS DE WINTON, opened with a reference to the science of applied geography, and then passed to a review of the most recent explorations and discoveries, whilst in the Economic Science and Statistics Section (F.) Professor EDGEWORTH dealt with the points at which mathematical reasoning is applicable to political economy. In the address to the Mechanical Science Section (G.) physics and chemistry, rather than mechanics, occupied the dominant position. The molecular structure of matter was the first topic descanted upon by Mr. WILLIAM ANDERSON, his pretext being that it is imperatively necessary that mechanics should interest themselves more deeply in the internal structure of the materials they use and in the true meaning of the laws by which the properties of these materials are defined. Then followed a passage relating to the origin of petroleum, in which favour was accorded to MENDELEJEFF'S theory that its formation is due to the contact of water with incandescent metallic carbides, after which came a plea for the establishment of a standard "horse-power." Lastly, in the Anthropological Section (H.), Professor SIR WILLIAM TURNER delivered an interesting address on Heredity. The usual lectures were delivered to good audiences, the first, on Friday, the 13th inst., by Professor ROBERTS-AUSTEN, the subject being the Hardening and Tempering of Steel, and the second on Monday last, by Mr. WALTER GARDINER, on How Plants maintain themselves in the Struggle for Existence.

It only remains to say that Sir FREDERICK ABEL has been chosen as President of the meeting of the Association to be held next year in Leeds, and that an invitation to meet in Cardiff in 1891 has been accepted.

At the last meeting of the Council of the Midland Counties Chemists' Association it was decided that classes for students should be held in connection with the Association during the forthcoming session, provided that a sufficient number of persons send in their names as being desirous of attending them. In a large town like Birmingham there ought not to be much doubt as to the fulfilment of such a condition, and it may be hoped that there will be a speedy and numerous response to the invitation of the Council. It was also resolved that the session should be opened towards the end of October by a Conversazione, at which the President will deliver an address.

* * *

At the recent International Congress on Forensic Medicine, held in Paris, a report was presented by Messrs. Lutaud and Descoust on the legal questions arising from the abuse of morphine, in which the question was discussed as to how morphiomaniacs obtain the poison. It was stated that there had been some severe sentences pronounced in France in recent years against pharmacists for illegally supplying the drug, but it was added that it has now been ascertained that in a great number of cases the morphine is obtained from wholesale druggists and commission agents, upon whom the only legal restriction imposed is that of entering in a book the name and address of the person to whom a sale is made. The astonishing statement was also made by one speaker that in the northern provinces of France it is becoming quite the fashion to give evening parties where the principal diversion is the administration of subcutaneous injections of morphine to the guests. A resolution was eventually passed by the Congress to the effect that wholesale druggists and manufacturers of chemicals ought not to supply morphine or cocaine to others than dispensing chemists, and that a prescription ordering either of these substances ought not to be made up more than once without the authority of the prescriber.

* * *

In a paper in the current number of the *Revue des Sciences Naturelles Appliquées*, on vegetation in Portugal, reference is made to an extraordinary dragon-tree (*Dracæna Draco*) growing in the garden attached to the royal palace at Ajuda, near Lisbon, which is supposed to have attained a development unequalled by any other similar tree in the world. The crown of the tree, the under part of which is scarcely two metres from the ground, is upwards of 36 metres in circumference (about 120 feet), and in its upper outline forms a perfect dome. There is a tradition that this tree was imported and planted in the garden when it was first created, upwards of three centuries ago.

* * *

It may interest some readers to learn that the *Scilla maritima* is now in flower in the Economic House, Kew Gardens.

* *

We understand that the photograph taken at Hexham of the Conference excursion party has turned out very well, and that copies unmounted may be obtained from Mr. J. Pike, 1, New Bridge Street, Newcastle, price 2*s.* 1*d.*, post free.

British Pharmaceutical Conference.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at the Durham College of Science, Newcastle-on-Tyne, on Monday, September 9, 1889, at 10 p.m.

Present.—Mr. Umney (President) in the chair, Messrs. Atkins, Benger, Brady, Clague, Conroy, Dott, Gerrard, Maben, Martin, Reynolds, Schacht, Woolley, and Mr. Martindale (Hon. Treasurer), Dr. Thresh and Mr. Naylor (Hon. Gen. Secs.), and Mr. J. C. Nightingale (Asst. Secy.).

The minutes of the previous meeting were read and confirmed.

Intimations of inability to attend were announced as having been received from Professor Attfield, Messrs. Brunker, Davies, Greenish, Stephenson and Symes.

The Treasurer's financial statement for the year 1888–89 was read and approved.

A draft report for presentation at the annual meeting was submitted by the Hon. Gen. Secs., and after correction of a clerical error was agreed to.

The Hon. Gen. Secs. reported that with reference to two of the papers to be read at the general meeting, they had suggested that the authors should make certain alterations, so as to leave no doubt as to their suitability and their acceptance by the Committee. In each case the suggestions had been kindly received and promptly acted upon.

Copies of a draft programme of the business of the general meeting were placed before the members.

This was discussed and finally arranged.

Mr. Naylor then stated that the MS. of the 'Year-Book' for 1889, as far as it could be completed, was in the hands of the printers.

The place of meeting for 1890 was considered.

Mr. Reynolds announced that he had been deputed by the Leeds Association to extend to the Conference a cordial invitation to hold its next sessions in that town, and if the invitation were accepted he could bespeak for them a characteristic Yorkshire welcome.

The President commended this invitation to the members, who expressed it as their pleasure that it should be recommended to the meeting for acceptance.

Mr. Martin informed the Committee that Principal Garnett would attend the meeting at ten o'clock in the morning to welcome the members of the Conference.

Nineteen gentlemen were duly nominated and elected to membership.

MEETING AT NEWCASTLE-UPON-TYNE.

FIRST DAY'S PROCEEDINGS.

Tuesday, September 10.

(*Continued from page* 219.)

Reading of Papers.

The reading of papers was then proceeded with, the first being a—

Note on Tincture of Senna.

BY B. S. PROCTOR, F.I.C.

At the last revision of the blue list I suggested the question as to the activity of the tincture of senna.

I consider that it is discreditable to the medical profession that an inert preparation of an active drug should remain in the Pharmacopœia, and discreditable to the pharmaceutical body that it should remain there without a protest.

Personally, I have been convinced for some years of the worthlessness of tincture of senna as now prepared, and have protested, though ineffectually, against its retention among the official preparations. My desire in bringing the subject before the Conference is that further experience and expression of opinion from our members may lead either to a modification of the formula or its deletion from the Pharmacopœia.

Christison in his 'Dispensatory,' says of senna: "Its active part is easily dissolved out by water, either cold or warm, by rectified spirit, and by proof spirit."

Flückiger and Hanbury quote the words of Dragendorff and Kubly: "The active substance is a colloid body, easily soluble in water, but not in strong alcohol. A syrupy aqueous extract of senna mixed with an equal volume of alcohol throws down mucilage; after this is removed a further addition of alcohol causes a precipitate of brown matter, almost tasteless, and possessing purgative properties, containing cathartic acid, which is almost insoluble in water in the absence of bases, and insoluble in alcohol; soluble in warm dilute alcohol."

Various other authorities might be quoted as to cathartic acid, or cathartogenic acid, as some call it, being the purgative principle of senna, and as to its insolubility in water and alcohol, coupled with the statement that its alkaline salts are soluble in water and are active cathartics. There would, however, be no great advantage in multiplying any testimony which was not a direct statement of the data upon which conclusions had been built. The use in the 'Pharmacographia' of the expressions "strong alcohol" and "dilute alcohol" leave us in doubt as to the meaning of the writer. Is "alcohol" rectified spirit or absolute alcohol? If we suppose the alcohol to be rectified spirit, an equal volume of which throws down the mucilage but not the active principle, we would conclude that the spirit for making tincture of senna might be equal volumes of rectified spirit and water. The further addition of "alcohol," which throws down the active matter, may be the quantity which is necessary to raise the strength up to that of proof spirit; and this would bring the statement of Dragendorff and Kubly into accordance with my experience, and confirm my impression that tincture of senna ought either to be abolished or made of a weaker spirit than that now official.

Some years ago, with the view of testing the solubility of the senna-purgative in rectified spirit, I percolated half an ounce of powdered senna with rectified spirit by the aid of pressure, till in the course of three days' slow percolation 1½ ounce of percolate was obtained, the last half ounce of which had but little taste of senna, though considerable colour. The percolate being evaporated yielded 36 grains of soft hygroscopic extract.

Percolation continued till a second percolate of 1½ ounce was obtained, which on evaporation yielded 6 grains of residue.

The first 36 grains of extract was rubbed up with water, in which it partially dissolved, producing a solution which had a full senna flavour. I took half of it for a dose, and the remainder a few hours after, with no effect.

The portion of alcoholic extract not soluble in water was made into an emulsion with gum and water and taken as a dose without any effect.

This I considered fairly disposed of the idea that rectified spirit extracts the purgative principle of senna, but to confirm my conclusion I took the senna marc which had been exhausted with spirit and made a draught of it with water.

It produced pretty strong catharsis with griping. Thus it appears, so far as my constitution may be taken as a guide, that rectified spirit does not remove from senna either its purgative or its griping qualities.

Proof spirit was next to be tried, and I took as a dose 1 ounce of the B.P. tincture of senna without any effect. My temperance habits stood in the way of my taking it by the pint, which would probably have been necessary to produce any results beyond those dependant upon alcohol.

In the spring of 1883 I published, in the second edition of my "Lectures on Practical Pharmacy," the results of the experiments just described. In June of the same year, at the suggestion of the Pharmacopœia Revision Committee of the Medical Council, I made many suggestions for alterations of official formulæ, including the following:—

"*Mist. Sennæ.*—Omit the tincture of senna, which is inert, or substitute for it a further addition of tincture of cardamoms. See below, and 'Pharmacy,' page 370."

"*Senna.*—The tincture of senna is inactive and useless, the active matter being insoluble in spirit. See 'Pharmacy,' page 370."

"*Tinctures.*—Tincture of senna is inactive and might be expunged."

These suggestions did not meet with the acceptance to which in my conceit I thought them entitled, and of which I still think them worthy.

My desire in bringing this subject before the present meeting is that others should experiment upon similar lines to those I have indicated, and by personal trial test the efficacy of senna preparations made with spirit, more or less dilute, and thus determine the question whether tincture of senna should be abolished or amended.

The PRESIDENT said this was a very practical subject, with which Mr. Proctor was well qualified to deal. He should be glad to know whether the variety of senna used was Tinnevelly or Alexandrian, as it was pretty generally agreed that the latter was the more active. He believed that was shown by Henry Deane many years ago.

Mr. GROVES (Weymouth) said he made a long series of experiments some years ago on senna and succeeded in isolating the active principle, but unfortunately for his priority, Prof. Dragendorff had done the same thing a few weeks earlier. He was rather surprised to hear that the tincture made with proof spirit was entirely inert, because he found that with equal measures of rectified spirit and water he succeeded in extracting the active principle very completely. The method in which he succeeded best in obtaining the mixed cathartates, was by making a strong tincture with equal measures of rectified spirit and water, and then adding to the tincture expressed from such a maceration an equal volume of rectified spirit. The cathartates were then thrown down in a state of purity, and quite free from odour. He could quite understand that treating senna with rectified spirit would fail to extract any of the active matter, but it would be very effective in removing the nauseous odour and taste of senna. When the cathartates were thrown down by alcohol, the nauseous odour and taste were retained in the supernatant fluid. He did not, however, think it would be wise to eliminate the tincture from the Pharmacopœia; such a measure would be too radical and unnecessary; it would be much better to dilute the spirit, using equal measures of spirit of wine and water. Senna was a useful drug, and a good tincture should be prepared. He believed the syrup was a worse preparation than the tincture, its efficacy being almost all destroyed by the boiling and stewing it underwent.

Mr. DOTT was rather surprised that no reference had been made to the work of Dr. Stockman, a distinguished member of the Conference, on senna. Dr. Stockman had found that a very powerful effect on small animals was produced by pure cathartic acid, which is soluble in alcohol. Mr. Proctor's results did not appear to be altogether in accordance with those of Dr. Stockman, but it was a very interesting and practical paper.

Mr. BALL said he had recently made some experiments on commercial cathartic acid, and found it inactive, but cathartate of soda or magnesia produced decided catharsis. He had taken 8 grains of ordinary commercial cathartic acid with no result at all. He should presume that in the ordinary tincture of the Pharmacopœia the cathartic acid was precipitated, and there was not sufficient water to dissolve it, nor sufficient alkali in the senna to form a cathartate of the alkali. This would to a great extent account for the inactivity of the product.

Mr. GERRARD said his experience of this tincture did not altogether agree with Mr. Proctor's. It was used occasionally in the institution to which he was attached, and he never heard any complaints of its action, but that might be from want of observation on the part of those prescribing it. They must, however, have an idea that the official dose was not sufficient where a purgative effect was required, as they invariably ordered half an ounce for a dose. One point of the paper was to show the necessity for having in the Pharmacopœia a greater variety of strength of alcohol, instead of only three, absolute alcohol, rectified spirit and proof spirit. In the American Pharmacopœia there was a "dilute alcohol," which contained 45 per cent. by weight (the English proof spirit containing 49 per cent.), and that was used in certain cases where a weak spirit was more efficient in extracting the active principle.

Mr. WRENN said Mr. Gerrard had anticipated what he was about to say as to the advantage of using a dilute alcohol for the manufacture of such tinctures as the one now under notice. Senna had already established a reputation for itself amongst the public, especially the aqueous preparations, and he believed that even a lower strength of spirit than Mr. Gerrard had suggested might be used, viz., 60 per cent. under proof, such as was universally used in the manufacture of concentrated infusions. There was a paper to be read on infusion of gentian, and then no doubt the question of concentrated infusions would be raised.

The PRESIDENT said there was no question that the rule of thumb had been very much followed in giving the directions in the Pharmacopœia as to the strength of alcohol. The suggestion of Mr. Gerrard was a very good one, and probably a mixture of half water and half rectified spirit, or 20 under proof, would be about right for the tincture of senna. It would not do for the Conference to recommend, however, that the tincture should be so made immediately, or they might get into difficulties with the excise, or with public analysts; still it was a matter which should be settled without delay. The Americans had made a great study of the particular strengths of alcohol which were best suited for the extraction of the medicinal properties of various drugs, and it might be well to take a leaf out of their book. The Conference was much indebted to Mr. Proctor for this paper.

Mr. PROCTOR in reply said he by no means wished what he had said to be taken as a settlement of the question, but rather as an opening of it. He did not consider that half and half spirit as taken by himself and some others should be taken as the right strength. His idea was that the right method would be to macerate senna with a small quantity of water, to make pressure first with the water alone, and then to add to the strong aqueous solution as much spirit as would throw down the mucilage, falling short of that which would precipitate the active principle, and then after filtration use that instead of the present tincture. He should have been disposed to experiment in that line, if he had not felt that if he commenced experimenting again he must try a dose; but he had already taken about plenty, including senna, aloes, scammony, *Rhamnus Frangula*, *Rhamnus Purshiana* and others, and he had suffered from it. He wished the subject should be taken up, and did not think it could be undertaken by a more competent body than the Formulary Committee. If the members of that Committee would take the doses he would make the drugs. He must not be sup-

posed to say that cathartic acid was the native principle; probably it was a cathartate of some kind, possibly of lime, but the business of the pharmacist was to get the activity in solution, no matter whether it were cathartic acid, cathartate of lime, or of magnesia, soda, or anything else. They were perhaps rather too much inclined to refined chemistry where the practical results was the important thing; and they were so long settling the theory that in the meantime they lost the practice. It was for them to get the good practical result, and let the high scientific gentlemen who loved science for its own sake settle questions of theory. With regard to the activity of different kinds of senna, he had no special experience to offer, but he believed Professor Christison said Tinnevelly was quite equal to the Alexandria; but as doctors differed he took the precaution in his experiments to prove that the senna which had been operated on was a good purgative senna, and it mattered not to him where it came from. He had had in mind the question which Mr. Gerrard had raised as to the solvent powers of different strengths of alcohol, and he looked on senna as a matter which would help to bring about a reform in that direction. There were many things in the Pharmacopœia which might be made with advantage with a weaker spirit than was at present used. There was no need to fear the exciseman, as he had nothing to do with it.

The next paper read was on—

Papain as a Digestive Agent Compared with Commercial Pepsines.

BY A. BALL.

Papain or papayotin as supplied commercially is of a brownish white colour, sometimes free from smell, at others possessing a peculiar odour similar to that of indol. Commercial papain is prepared from the juice of the leaves and fruit of the *Carica papaya* (*Papaya vulgaris*, D.C.). It is stated to have been indigenous to the American continent, although it is now found in the tropical parts of Asia and Africa. The fruit is edible, and the bruised leaves of the papaw possess the remarkable property of causing a tough steak to become tender when wrapped in them for a few hours, the proteolytic ferment causing separation of the muscular fibres. Papain is usually prepared from the milky juice, fresh or dried, by solution in water and subsequent precipitation by alcohol of the papayotin. The purity of papain depends upon the number of times the process is repeated, the whiter samples appearing to possess the highest activity. The following three samples used for testing the digestive power were obtained from different houses of good repute.

Sample A, white in colour, possessing slight odour, was subjected to the following test:—Five grains of the papain were placed in 4 ozs. of a 1 per cent. per vol. of HCl in distilled water, to which was added 100 grains of finely divided fibrin, obtained from rump steak, the whole kept at a temperature of 110° F. in a water bath for three hours. The amount of fibrin dissolved was 60 grains.

Sample B, yellowish colour, possessing peculiar odour of indol, subjected to same test, digested 44½ grains of fibrin.

Sample C, light brown colour, distinct odour, when subjected to same test digested 22 grains of fibrin. The experiments were repeated with coagulated egg albumin; 100 grains of egg albumin, carefully cleared of any adhering yolk, were passed through a fine hair sieve, and placed in an acidified solution containing 1 per cent. per volume of HCl in distilled water, 1 grain of papain added, and the whole kept at a temperature of 100° F. in a water-bath for three hours.

Sample A dissolved 94 grains, B 80 grains, and C 30 grains. The action of the three samples with milk was marked in the same ratio, a quarter of a pint of fresh milk with 2 grains of the papain, to which was added 2 ozs. of distilled water, containing 1 per cent. per volume of HCl, the whole digested for two hours at a temperature of 100° F. in a water bath. In the case of sample A, the curd of casein formed when the acid solution was added commenced to dissolve slowly, and at the end of the time was all digested excepting a granular precipitate of the curd. The fat liberated by the digestion of the enveloping casein was not in the least emulsified. With sample B the digestive action was considerably less marked. With sample C hardly any action was exerted upon the curd of casein.

With regard to the digested product, when albumins are acted upon by papain in an acidified solution, the dried residue obtained by careful evaporation of the filtered solution does not appear to be readily soluble in water, and when mixed with water and placed upon a membranous dialyser, floated on distilled water, this product, unlike peptones obtained by the digestive action of pepsin upon proteids, does not in the least degree diffuse through the membrane into the water, but diffusion commences when acid or alkali is added; in this respect, it would seem to be more nearly allied to the globulin series.

Pepsin is prepared by a great variety of methods hereinafter detailed. The term "pepsina porci, B.P.," really means nothing, and as regards the proteolytic test prescribed by the British Pharmacopœia, viz., "2 grains of pepsin with an ounce of distilled water, to which 5 minims of hydrochloric acid have been added, forms a mixture in which at least 100 grains of hard boiled white of egg, passed through a wire gauze sieve of 36 measures per linear inch will dissolve, on their being well mixed, digested and stirred for about thirty minutes at a temperature of 130° F.," I suggest that the test should be 1 grain to digest 500 grains of coagulated albumin in the same acidulous medium. Insomuch that I have found 1 grain of the best pepsins in the market will digest from 500 to 1500 grains when subjected to the prescribed test, I am at a loss to understand why pepsins containing a variable amount of milk sugar and starch or peptones should be the only ones made official. Doubtless when a physician orders pepsin he means pepsin of the highest digestive power and most likely to give satisfactory therapeutic results. Some intelligent pharmacists do now dispense the pepsin guaranteed pure and free from any admixture, and it is sincerely regretted the majority do not do the same. The following table represents the activity of the various pepsins and papains in the market when coagulated albumin is to be digested.

No. sample.		Amount used.	Digested.
1 . . .	Pepsin	1 grain	1·308 grain
2 . . .	Pepsin	1 grain	1·200 grain
3 . . .	Pepsin	1 grain	1·105 grain
4 . . .	Pepsin	1 grain	·980 grain
5 . . .	Pepsin	1 grain	·430 grain
6 . . .	Papain	1 grain	·342 grain
7 . . .	Papain	1 grain	·108 grain
8 . . .	Pepsin	1 grain	·103 grain

In each case 5 ounces of distilled water containing 1 per cent. per vol. HCl was used, to which 2000 grains coagulated egg albumin, finely divided by passing through a hair sieve, were added, and the whole kept agitated in a water bath at 100° F. for three hours. The difference in amount of albumin dissolved by the papains is accounted for by the increased amount of surface exposed to the action of the ferment by the greater number of particles. The different amounts of proteolytic action exerted upon finely divided fibrin obtained from lean rump steak is shown in the photograph of the different bottles exhibited. In

each case 9 drachms of fibrin, 6 ounces of distilled water with ½ a drachm HCl and 10 grains of the ferment were digested together for three hours in a water-bath at a temperature of 100° F.; the undigested fibrin is shown by the sediment in each bottle. Fibrin seems to me to be the most reliable test of the activity of a pepsin to be used in medicine, its action successfully performed upon derived albumin being more desirable than its activity upon native albumin when testing its activity as a medicine, the native albumin being generally converted into acid-albumin by the acid of the gastric juice. Further the activity of a digestive ferment should be estimated by the amount of pure peptones actually obtained, that is, peptones perfectly soluble and diffusible, the diffusibility being the chief test. If a solution containing peptones is placed in a membranous dialyser floated on distilled water the whole of the peptones will quickly diffuse through into the water. The product from papainized fibrin will not dialyse through. This goes to prove that papain does not wholly digest the fibrin whether in acid or alkaline media, but its action renders the fibrin more easily digested by the natural ferments.

The activity of pepsin is doubtless due in a great measure to the method adopted in its manufacture. The best pepsins are prepared by extracting the ferment from the secreting membrane through maceration in glycerine, but it is a method impossible excepting by experts in manufacturing operations. The solution is extremely difficult to filter, scale and pulverize, and finally to obtain a pepsin free from albuminous matter. Physiologists obtain a little pure pepsin experimentally by the employment of alcohol as a precipitant, allowing the membrane to stand in alcohol and then extracting the ferment with glycerine. This process is extremely unreliable, as strong alcohol exerts an injurious action upon the ferment. Another method is to precipitate the pepsin with salt; the magma which separates floats upon the macerating fluid and is largely impregnated with salt. This is partially removed by expression and by allowing the salt to effloresce upon the surface of the expressed magma cake. The entire purification can only be obtained by dialysis, and this washes away a good quantity of the ferment itself, therefore the process is not recommended for commercial use, and should the product not be entirely freed from salt it is unjust to place it upon the market as a pure pepsin, when a purchaser would be paying so much per ounce for salt. There is another process yielding what are termed peptone-pepsins, in which the lining membrane of the stomach is subjected to acidulous digestion with heat, when the whole tissue in which the pepsin is secreted is converted into peptones. The acid is precipitated in the form of a salt and the syrupy solution of peptones and pepsin clarified and reduced to a dry form; by this method a larger yield is obtained, consequently it can be supplied cheaper, the activity being reduced in the same ratio.

Scheffer's method is to precipitate the pepsin from solution in the form of a magma with salt. The whole is expressed, and while still containing a certain amount of moisture and salt is mixed with milk sugar, and the paste spread upon a glass plate is dried and then pulverised. The best sample of this kind does not contain more than 5 per cent. pure pepsin. There is another process, and the pepsin thus made has a large sale in this country. The magma is obtained as in the foregoing, is expressed, and mixed with 90 per cent. of starch as the least estimate. This amyllated magma is dried and reduced to powder. Dr. Pavey in 1863 stated that numbers of so-called pepsins were in the market and should be discarded. I mention that I find a simple test of the freedom of pepsins from admixture with starch, mucus, and peptones is the non-stickiness of really pure pepsin when exposed to the atmosphere.

The PRESIDENT, in inviting discussion, said Mr. Ball had a photograph which he would hand round, showing the amount of undissolved albumen in six different bottles, which would give some rough idea of his results.

Mr. BENGER said he had been interested in papain, and had tested samples several times from curiosity, but his results had been almost entirely negative, though he had tried it in acid, alkaline and neutral solutions, with coagulated albumen (white of egg). He tried it at different temperatures and for long periods. Different samples of pepsin differed very much, as could be easily proved even by the Pharmacopœia method, though it was by no means perfect. His plan was to stand a number of test tubes in a large beaker of water, each tube containing coagulated white of egg in acidulated water, and instead of keeping it at the temperature of the body, he raised it to about 120° or 130°, at which the activity of pepsin reached its maximum; carefully weighed quantities of pepsin or its preparations were then added to each tube, and the mixture stirred at regular intervals. It had been found by himself and others that those pepsins which were most active at 130° were also most active at the temperature of the body, and in this way much time was saved. Heating the different samples in this way you could see in ten minutes which was the most active. With fibrin it was not nearly so easy to see the result. Some pepsins possessed practically no activity whatever, whilst others were extremely active. If a large quantity of acid solution were used, an active pepsin would dissolve a very large quantity of white of egg or fibrin, so that the statement sometimes made in advertisements that 1 grain would dissolve so much white of egg meant almost nothing, because the conditions of the experiment were not given.

Mr. SCHACHT said he should be glad to know if any gentleman could afford any information as to the best way of determining whether the result of adding pepsin to white of egg was a peptone or not. Dissolved albumen was not necessarily peptone. The only available means of determining the quantity of peptone produced with which he was acquainted was by dialysing it, which was very troublesome, and he should be very glad to know if there were any better or more readily applicable method. Fehling's solution gave the colour, and so forth, but he had not satisfied himself that there was any process by which it could be readily ascertained whether a solution contained peptones, or was merely soluble albumen.

Mr. NAYLOR said the question in which he was most interested was this, that the author had had an opportunity of experimenting with a pepsin which he pronounced to be absolutely pure. He wished, therefore, to ask Mr. Ball how much fibrin or white of egg absolutely pure pepsin would dissolve. He begged to dissent mildly from the inference which Mr. Ball drew, that the intelligent pharmacist should discard altogether the Pharmacopœia article. So long as they had such an article in the Pharmacopœia and a test given for it he hoped they would be loyal to the Pharmacopœia, and where pepsin was ordered (apart from any particular make) would use it according to the authoritative standard. He did not quite catch whether the pepsins were tested by the Pharmacopœia method, or by the one in which 5 ounces of distilled water containing 1 per cent. by volume of hydrochloric acid was used. Had Mr. Ball found in the market pepsins which when tested by the Pharmacopœia method gave as a result that 1 grain would dissolve 1500 grains of white of egg?

Mr. MARTINDALE remarked that pepsina porci, B.P., had been spoken of, but there was no such thing in the Pharmacopœia; very often the official pepsin was not made from the pig. The pepsin of the B.P. seemed

to be a different article altogether from that described in the paper. So long as there was an official article they should adhere to it, and if other modes of making pepsin were introduced, let them take different names.

Mr. GERRARD said he had had some experience in the use of pepsin and to some extent of papain, with regard to which he could confirm what Mr. Benger had said. It seemed to have an eroding action, breaking up the substance to which it was applied rather than dissolving it, in the way in which pepsin dissolved albumen or fibrin. Working with pepsin of good quality, which he prepared himself by scraping and roughly cleansing the complete stomach, drying it very carefully, or precipitating it by alcohol, he found that in a ·2 per cent. hydrochloric acid solution at a temperature of 130° F., which was a far better temperature to experiment with than anything below it, one grain would dissolve 1000 grains of white of egg. At 130° the process went on most rapidly, and what he had described would take place in fifteen minutes, but if it were desired to imitate the process of digestion and form a peptone, the process must be continued about three hours. The first action of pepsin on the acid mixture was to produce acid albumen, and then it went on to the gradual production of peptone, and as the peptone developed its presence could be indicated by a colour reaction, the intensity of which was a measure of the total peptonization. After digesting about half an hour, if you took a little of the peptone and added to it about an equal volume of solution of potash, Pharmacopœia strength, and one or two drops only of a 10 per cent. solution of sulphate of copper, it gave a fine pink tinge, and if tested from time to time every ten or twenty minutes the intensity increased until it reached the climax in about three hours. That was a test which anyone could apply, and he had demonstrated it to more than one gentleman present.

Mr. BARCLAY asked if Mr. Ball had tested any samples of commercial pepsin and found them to be of the Pharmacopœia standard? Also, if he had ascertained whether or not any change occurred on keeping.

Mr. WRENN said some experiments he made a few years ago, when he read a paper before the Chemists' Assistants' Association, led him to confirm the opinion expressed in the paper that commercial pepsin was readily found of which 1 grain would dissolve 1000 grains of coagulated albumen. Papain was a commercial failure compared to pepsin. He agreed with Mr. Benger as to the temperature to be used; if the Pharmacopœia directions were followed much valuable time was wasted. In the preparation of pepsin he should not introduce glycerine, as Mr. Ball suggested, for how was it to be got rid of in preparing the pure pepsin. Some makers put on their labels, "This pepsin is guaranteed to be made from the stomach of a pig in our laboratory." Whether the pig was always there he did not know, but pepsina porci was certainly more active than that made from the stomach of a sheep.

The PRESIDENT said Mr. Ball had expressed himself at a loss to understand why pepsins containing a variable amount of milk of sugar and starch were the only ones official, but he did not remember any directions in the Pharmacopœia for the dilution of pepsin with these substances. Probably there were such pepsins, but he did not know that they were official.

Mr. MARTINDALE: Not in the Pharmacopœia. There was one such in the French Codex.

Mr. BALL in reply to Mr. Naylor's question why he did not use the test of the B.P., could only say that he wished to test the activity of the pepsin at the temperature of the stomach, which was said to be 100°, and he continued the digestive process for a longer time, three hours in every case, instead of thirty minutes; he wished to have a parallel process to that which went on if pepsin were taken internally for medicinal purposes. In reply to Mr. Martindale he might say that he applied to four wholesale houses for Pharmacopœia pepsin, and in each case the bottle came to him labelled "Pepsina porci, B.P." On testing these he found in each case it contained starch, which he took to be an adulterant, as it was not generally found in the mucous membrane of the pig or any other animal. With regard to peptone, the test mentioned by Mr. Gerrard was an excellent test for the presence of peptone, but did not answer for quantitative purposes. If albumen were digested with pepsin in an acidulated solution, the resulting product filtered and the solution evaporated a dry residue was obtained; of course the heat must be kept very low, so that the product should not be burned. If this residue were then mixed with water and placed on a dialyser the whole of the peptones would dialyse through, but the albuminous and other intermediate bodies would not, and would be left on the membrane. This, therefore, was a good quantitative test. It was quite true that the B.P. did not contain such a process as he had described, but he maintained that starch or sugar of milk when added were simply adulterants, as they were not then there for any therapeutical purpose. If they did not aid the digestive process why were they added, except to increase the weight and the amount of profit attaching to the sale. It was suggested that they were added as a diluent to get the product to the Pharmacopœia strength, but if so, why could not the Pharmacopœia contain an article 1 grain of which would do as well as 5 grains of the one now placed there. It would at any rate economize space. He had not tested specially to see if pepsins recently prepared differed at all from those which had been kept some time, but he had repeated after an interval of time the tests of the specimens of commercial pepsins to confirm his previous results, and the difference was so slight as not to be worth noticing. Mr. Benger said fibrin was not a good indication of the digestive power of pepsin, but in his (Mr. Ball's) opinion it was so satisfactory that if a digested solution were left to stand for three days there would be a perfect precipitate of the undigested fibrin, which was insoluble in any menstruum; this could be dried and weighed, and the amount deducted from the original amount, which would indicate the amount of peptone in solution. Mr. Naylor asked how much white of egg pure pepsin would digest when submitted to the Pharmacopœia test, but he found the B.P. test faulty in this respect, that the gastric juice was never found so acid as was suggested in the test; ·1 or ·2 per cent. of hydrochloric acid was the highest of any such extract juice, but the B.P. test was 5 minims of hydrochloric acid to 1 ounce of distilled, which was equal to ·3 per cent. Most physiologists suggested that a ·2 per cent. solution was the highest that should be used, and the same amount of alkali in another medium for testing the activity of pancreatin.

The PRESIDENT asked if Mr. Ball had found that pure pepsin from the stomach of sheep was stronger or weaker than that made from the pig's stomach?

Mr. BALL said all which he had tested were said to be from the stomach of the pig.

The PRESIDENT said the Conference was much indebted to Mr. Ball for bringing forward this subject, on which a great deal of work had been done, but the more it was discussed the more they found how little they knew about it. There were, no doubt, pepsins containing sugar of milk and other diluents, but these ingredients were probably added to reduce the preparations to the B.P. strength.

The next paper read was—

Are Glass Bottles Soluble?

BY R. REYNOLDS, F.I.C., F.C.S.

The *Pharmaceutical Journal* for August 31, 1889, p. 163, contained a somewhat startling statement as to the action of chloral hydrate upon a glass bottle in which it had been stored for a long time. The case was reported by Herr Reuter, who found the crystals of chloral hydrate lying next to the glass to be intensely blue. The colour was proved to be due to nickel, doubtless contained in the smalt employed in the manufacture of the blue glass.

Such an instance recalls the older illustrations of the liability of glass to attack by substances preserved in vessels of that substance. That strong alkaline solutions should attack flint glass does not cause us any surprise. The influence, too, of the prolonged action of a relatively weak volatile alkali in the atmosphere has long been known, and old glass windows in stables have been pointed to as examples of the action of air containing free ammonia.

Glass long submerged in water and mud may show the action of disintegrating influences. The most striking illustration of this which I have met with was a portion of an antique bottle taken from the moat of Walton Hall, near Wakefield, at the time when it belonged to the late Charles Waterton, the naturalist. The specimen had probably lain in the mud for two centuries. For still older illustrations of metamorphosed glass, as that recovered from buried cities, it is only needful to refer to our public museums.

The decomposition of hydrocyanic acid when kept in white flint bottles would appear to be due to the influence of the glass. It would be interesting to know if any of the troublesome cases of decomposition of organic solutions, such as those intended for hypodermic use, are in any instance referable to this cause. It will doubtless be necessary to recognize that there are bottles—and bottles. The more faulty sort may, fortunately, not be of everyday occurrence.

I recently met with a little evidence favouring the idea of the chemical interference of a bottle with its contents, and bring it forward as indicating one of the possible directions for further inquiry. This occurred in connection with the interesting subject of the acidity of the gastric juice. Professor Riegel, of Giessen, has undertaken the investigation of this subject clinically. He uses small sponges, encased in gelatine, one of which is swallowed, and is withdrawn in about ten minutes, when the gelatine will have dissolved. The sample of gastric fluid thus obtained is tested for HCl by Congo red paper. Congo red assumes a deep blue colour on contact with acids. This is much more pronounced in the case of inorganic than organic acids; acid salts produce no alteration of colour. It is stated that the delicacy of the test is such that 0·002 per cent. ($=\frac{1}{50000}$) of free HCl can be found. One minim of HCl in 20 fluid ounces of distilled water (or, say $\frac{1}{100000}$) is certainly appreciable. It was a solution of this strength, which, after keeping for a day in a flint-glass bottle, failed to give its previous reaction with Congo red paper. So far as I am aware, very weak solutions of HCl are supposed to be stable, and I did not think it unreasonable to refer the disappearance of the trace of acid to a possible action of the glass of the bottle. This line of inquiry may be worth the notice of anyone disposed to investigate the interesting and not unpromising question of what is the action of a glass bottle upon its contents.

Dr. Thresh said he had noticed a similar action some years ago when he was investigating the action of rain in a certain district on vegetation. It was supposed that some limekilns which had been recently erected materially affected the vegetation, and he collected the rainfall at many different points. When he collected the rain on litmus and other papers, he almost invariably found that it had an acid reaction, but strange to say, when collected in bottles, it was either neutral or distinctly alkaline. On investigating the cause of this he discovered that in all the bottles he employed—he tried all kinds and found the results the same—some decomposition took place in a very short time, and the free acid disappeared. His impression was that it was a decomposition of silicate of soda or of lime, in which the acid combined with the base, and the silica was thrown down. That this was the case was the more probable, because in evaporating samples of rain water he found that when collected in platinum dishes the solid residue per gallon was 1 to 4 grains less than when collected in glass, and this residue was chiefly silica. He also noticed in making further experiments that in titrating an acid solution if the acid were run in until a faint tint was produced with litmus, and then the liquid was boiled for a few minutes in a glass vessel, the colour would disappear. Upon adding acid the colour would again be obtained, which would again disappear on boiling, and so on; and he had seen students in the examination room go on repeating that process for an hour, thinking they were increasing the accuracy of the result, evidently not having observed that this naturally occurred when these solutions were boiled in glass flasks. Another thing still more interesting was this—if in one of these bottles (and they varied considerably though they were all acted upon) a mixture practically neutral and containing tincture of cardamoms was placed and kept in it for some time it would vary considerably in colour in the course of say a month, and it was quite possible that the complaints sometimes made as to the colour of such a mixture were due to this cause.

Mr. Linford said most chemists must have noticed that hydrochloric acid acted very considerably on the glass bottles in which it was kept, turning the glass white, while the sulphuric acid bottle was not affected so much. No doubt sulphuric acid must act on the glass in the same way, but the question was why the action ceased so much sooner.

Mr. Proctor had repeatedly observed that new bottles had an alkaline reaction in a much more marked degree than old ones. This probably arose from something on the surface, or else the solvent action of the water only penetrated a very short distance from the surface.

The President said it was necessary in these cases to be sure that the bottles had not been washed in alkaline solutions, such as washing soda, traces of which might be left behind.

Mr. Proctor said he referred to bottles which had come directly from the glasshouse. He attributed the smokiness to which he referred to the volatilization of something of an alkaline nature which was then condensed on the surface of the glass.

Mr. Martindale remarked that osmic acid very much affected white glass bottles of English make, whilst foreign white glass bottles were comparatively unaffected, except the stoppers. He held this action was due to the presence of lead in the glass, and it was desirable, therefore, to avoid bottles of glass containing lead for such purposes.

Mr. Maben remarked that the action of water and acid on glass might often be very well observed in syphon tubes.

Mr. Weddle thought perhaps the action of acids and alkalies on glass bottles might be due in part to the action of heat in annealing the glass. There was a slight efflorescence on new bottles, to which Mr. Proctor had referred, which might be caused by the annealing process, and render the glass liable to attack by substances placed in the bottle; and this

might be partially washed away after a time. It would be well to ascertain whether glass bottles in such cases were of English or foreign make, the former containing lead, while the latter did not.

(*To be continued.*)

The British Association for the Advancement of Science.

FIFTY-EIGHTH ANNUAL MEETING.

The President's Address.

(*Concluded from page* 200.)

It would be passing beyond the limits of time allotted to this address, indeed going beyond the scope of the Association, if I were to speak of many of the subjects which have pre-eminently exercised the faculties of the collector and formed the materials of which museums are constructed. The various methods by which the mind of man has been able to reproduce the forms of natural objects or to give expression to the images created by his own fancy, from the rudest scratchings of a savage on a bone, or the simplest arrangement of lines employed in ornamenting the roughest piece of pottery, up to the most lovely combinations of form and colour hitherto attained in sculpture or in painting, or in works in metal or in clay, depend altogether on museums for their preservation, for our knowledge of their condition and history in the past, and for the lessons which they can convey for the future.

Apart from the delight which the contemplation of the noblest expressions of art must produce in all cultivated minds, apart also from the curiosity and interest that must be excited by all the less successfully executed attempts to produce similar results, as materials for constructing the true history of the life of man, at different stages of civilization, in different circumstances of living, and in divers regions of the earth, such collections are absolutely invaluable.

But I must pass them by in order to dwell more in detail upon those which specially concern the advancement of the subjects which come under the notice of this Association—museums devoted to the so-called "natural history" sciences, although much which will be said of them will doubtless be more or less applicable to museums in general.

The terms "*natural history*" and "*naturalist*" have become deeply rooted in our language, but without any very definite conception of their meaning or the scope of their application. Originally applied to the study of all the phenomena of the universe which are independent of the agency of man, natural history has gradually narrowed down in most people's minds, in consequence of the invention of convenient and generally understood and accepted terms for some of its various subdivisions, as astronomy, chemistry, geology, &c., into that portion of the subject which treats of the history of creatures endowed with life, for which, until lately, no special name had been invented. Even from this limitation botany was gradually disassociating itself in many quarters, and a "naturalist" and a "zoologist" have nearly become, however irrationally, synonymous terms. The happy introduction and general acceptance of the word "biology," notwithstanding the objections raised to its etymological signification, have reunited the study of organisms distinguished by the possession of the living principle, and practically eliminated the now vague and indefinite term "natural history" from scientific terminology. As, however, it is certain to maintain its hold in popular language, I would venture to suggest the desirability of restoring it to its original and really definite signification, contrasting it with the history of man and of his works, and of the changes which have been wrought in the universe by his intervention.

It was in this sense that, when the rapid growth of the miscellaneous collections in the British Museum at Bloomsbury (the expansion of Sir Hans Sloane's accumulation in the old Manor House at Chelsea) was thought to render a division necessary, the line of severance was effected at the junction of what was natural and what was artificial; the former, including the products of what are commonly called "natural" forces, unaffected by man's handiwork, or the impress of his mind. The departments which took cognisance of these were termed the "Natural History Departments," and the new building to which they were removed the "Natural History Museum."

It may be worth while to spend a few moments upon the consideration of the value of this division, as it is one which concerns the arrangement and administration of the majority of museums.

Though there is very much to be said for it, the objection has been raised that it cuts man himself in two. The illustrations of man's bodily structure are undoubtedly subjects for the zoologist. The subtile gradations of form, proportion and colour, which distinguish the different races of men, can only be appreciated by one with the education of an anatomist, and whose eye has been trained to estimate the value of such characters in discriminating the variations of animal forms. The subjects for comparison required for this branch of research must therefore be looked for in the zoological collections.

But the comparatively new science of "anthropology" embraces not only man's physical structure; it includes his mental development, his manners, customs, traditions, and languages. The illustrations of his works of art, domestic utensils, and weapons of war are essential parts of its study. In fact it is impossible to say where it ends. It includes all that man is or ever has been, all that he has ever done. No definite line can be drawn between the rudest flint weapon and the most exquisitely finished instrument of destruction which has ever been turned out from the manufactory at Elswick, between the rough representation of a mammoth, carved by one of its contemporary men on a portion of its own tusk, and the most admirable production of a Landseer. An anthropological collection, to be logical, must include all that is in not only the old British Museum but the South Kensington Museum and the National Gallery. The notion of an anthropology which considers savages and pre-historic people as apart from the rest of mankind may, in the limitations of human powers, have certain conveniences, but it is utterly unscientific and loses sight of the great value of the study in tracing the gradual growth of our complex systems and customs from the primitive ways of our progenitors.

On the other hand, the division first indicated is as perfectly definite, logical, and scientific as any such division can be. That there are many inconveniences attending wide local disjunctions of the collections containing subjects so distinct yet so nearly allied as physical and psychical anthropology must be fully admitted; but these could only have been overcome by embracing in one grand institution the various national collections illustrating the different branches of science and art, placed in such order and juxtaposition that their mutual relations might be apparent, and the resources of each might be brought to bear upon the elucidation of all the others—an ideal institution, such as the world has not yet seen, but into which the old British Museum might at one time have been developed.

A purely "Natural History Museum" will then embrace a collection of objects illustrating the natural productions of the earth, and in its widest and truest

sense should include, as far as they can be illustrated by museum specimens, all the sciences which deal with natural phenomena. It has only been the difficulties, real or imaginary, in illustrating them which have excluded such subjects as astronomy, physics, chemistry and physiology from occupying departments in our National Natural History Museum, while allowing the introduction of their sister sciences, mineralogy, geology, botany and zoology.

Though the experimental sciences and those which deal with the laws which govern the universe, rather than with the materials of which it is composed, have not hitherto greatly called forth the collector's instinct, or depended upon museums for their illustration, yet the great advantages of collections of the various instruments by means of which these sciences are pursued, and of examples of the methods by which they are taught, are yearly becoming more manifest. Museums of scientific apparatus now form portions of every well-equipped educational establishment, and under the auspices of the Science and Art Department at South Kensington a national collection illustrating those branches of natural history science which have escaped recognition in the British Museum is assuming a magnitude and importance which brings the question of properly housing and displaying it urgently to the front.

Anomalies such as these are certain to occur in the present almost infantile though rapidly progressive state of science. It may be taken for granted that no scientific institution of any complexity of organization can be, except at the moment of its birth, abreast of the most modern views of the subject, especially in the dividing lines between, and the proportional representation of, the various branches of knowledge which it includes.

The necessity for subdivisions in the study of science is continually becoming more apparent as the knowledge of the details of each subject multiplies without corresponding increase in the power of the human mind to grasp and deal with them, and the dividing lines not only become sharper, but as knowledge advances they frequently require revision. It might be supposed that such revision would adjust itself to the direction taken by the natural development of the relations of the different branches of science, and the truer conceptions entertained of such relations. But this is not always so. Artificial barriers are continually being raised to keep these dividing lines in the direction in which they have once started. Difficulties of readjustment arise not only from the mechanical obstacles caused by the size and arrangements of the buildings and facilities for the allocation of various kinds of collections, but still more from the numerous personal interests which grow up and wind their meshes around such institutions. Professorships and curatorships of this or that division of science are founded and endowed, and their holders are usually tenacious either of encroachment upon or of any wide enlargement of the boundaries of the subject they have undertaken to teach or to illustrate; and in this way, more than any other, passing phases of scientific knowledge have become crystallized or fossilized in institutions where they might least have been expected. I may instance many European universities and great museums in which zoology and comparative anatomy are still held to be distinct subjects taught by different professors, and where, in consequence of the division of the collections under their charge, the skin of an animal, illustrating its zoology, and its skeleton and teeth, illustrating its anatomy, must be looked for in different and perhaps remotely placed buildings.

For the perpetuation of the unfortunate separation of palæontology from biology, which is so clearly a survival of an ancient condition of scientific culture, and for the maintenance in its integrity of the heterogeneous compound of sciences which we now call "geology," the faulty organization of our museums is in a great measure responsible. The more their rearrangement can be made to overstep and break down the abrupt line of demarcation which is still almost universally drawn between beings which live now and those which have lived in past times, so deeply rooted in the popular mind and so hard to eradicate even in that of the scientific student, the better it will be for the progress of sound biological knowledge.

But it is not of the removal of such great anomalies and inconsistencies which, when they have once grown up, require heroic methods to set them right, but rather of certain minor defects in the organization of almost all existing museums which are well within the capacity of comparatively modest administrative means to remedy, that I have now to speak.

That great improvements have been lately effected in many respects in some of the museums in this country, on the Continent, and especially in America, no one can deny. The subject, as I have already indicated, is, happily, exciting the attention of those who have the direction of them, and even awakening interest in the mind of the general public. It is in the hope of in some measure helping on or guiding this movement that I have ventured on the remarks which follow.

The first consideration in establishing a museum, large or small, either in a town, institution, society, or school, is that it should have some definite object or purpose to fulfil; and the next is that means should be forthcoming not only to establish but also to maintain the museum in a suitable manner to fulfil that purpose. Some persons are enthusiastic enough to think that a museum is in itself so good an object that they have only to provide a building and cases and a certain number of specimens, no matter exactly what, to fill them and then the thing is done; whereas the truth is the work has only then begun. What a museum really depends upon for its success and usefulness is not its building, not its cases, not even its specimens, but its curator. He and his staff are the life and soul of the institution, upon whom its whole value depends; and yet in many—I may say most of our museums—they are the last to be thought of. The care, the preservation, the naming of the specimens are either left to voluntary effort—excellent often for special collections and for a limited time, but never to be depended on as a permanent arrangement—or a grievously undersalaried and consequently uneducated official is expected to keep in order, to clean, dust, arrange, name, and display in a manner which will contribute to the advancement of scientific knowledge, collections ranging in extent over almost every branch of human learning, from the contents of an ancient British barrow to the last discovered bird of paradise from New Guinea.

Valuable specimens not unfrequently find their way into museums thus managed. Their public-spirited owners fondly imagine that they will be preserved and made of use to the world if once given to such an institution. Their fate is, unfortunately, far otherwise. Dirty, neglected, without label, their identity lost, they are often finally devoured by insects or cleared away to make room on the crowded shelves for the new donation of some fresh patron of the institution. It would be far better that such museums should never be founded. They are traps into which precious—sometimes priceless—objects fall only to be destroyed; and, what is still worse, they bring discredit on all similar institutions, make the very name of museum a byword and a reproach, hindering instead of advancing the recognition of their value as agents in the great educational movement of the age.

A museum is like a living organism—it requires continual and tender care. It must grow, or it will

perish; and the cost and labour required to maintain it in a state of vitality is not yet by any means fully realised or provided for, either in our great national establishments or in our smaller local institutions.

Often as it has been said, it cannot be too often repeated, that the real objects of forming collections, of whatever kind (apart, of course, from the mere pleasure of acquisition—sometimes the only motive of private collectors), and which, although in very different degrees, and often without being recognized, underlie the organization of all museums, are two, which are quite distinct, and sometimes even conflicting. The first is to advance or increase the knowledge of some given subject. This is generally the motive of the individual collector, whose experience shows him the vast assistance in forming definite ideas in any line of research in which he may be occupied that may be derived from having the materials for its study at his own command, to hold and to handle, to examine and compare, to take up and lay aside whenever the favourable moment to do so occurs. But unless his subject is a very limited one, or his means the reverse, he soon finds the necessity of consulting collections based on a larger scale than his own. Very few people have any idea of the multiplicity of specimens required for the purpose of working out many of the simplest problems concerning the life-history of animals or plants. The naturalist has frequently to ransack all the museums, both public and private, of Europe and America in the endeavour to compose a monograph of a single common genus, or even species, that shall include all questions of its variation, changes in different seasons, and under different climates and conditions of existence, and the distribution in space and time of all its modifications. He often has to confess at the end that he has been baffled in his research for want of the requisite materials for such an undertaking. Of course this ought not to be, and the time will come when it will not be, but that time is very far off yet.

We all know the old saying that the craving for riches grows as the wealth itself increases. Something similar is true of scientific collections brought together for the purpose of advancing knowledge. The larger they are the more their deficiencies seem to become conspicuous; the more desirous we are to fill up the gaps which provokingly interfere with our extracting from them the complete story they have to tell.

Such collections, are, however, only for the advanced student, the man who has already become acquainted with the elements of his science and is in a position, by his knowledge, by his training, and by his observing and reasoning capacity, to take advantage of such material to carry on the subject to a point beyond that at which he takes it up.

But there is another and a far larger class to whom museums are or should be a powerful means of aid in acquiring knowledge. Among such those who are commencing more serious studies may be included; but I especially refer to the much more numerous class, and one which it may be hoped will year by year bear a greater relative proportion to the general population of the country, who, without having the time, the opportunities, or the abilities to make a profound study of any branch of science, yet take a general interest in its progress, and wish to possess some knowledge of the world around them and of the principal facts ascertained with regard to it, or at least some portions of it. For such persons museums may be, when well organized and arranged, of benefit to a degree that at present can scarcely be realised.

To diffuse knowledge among persons of this class is the second of the two purposes of museums of which I have spoken.

I believe that the main cause of what may be fairly termed the failure of the majority of museums—especially museums of natural history—to perform the functions that might be legitimately expected of them, is that they nearly always confound together the two distinct objects which they may fulfil, and by attempting to combine both in the same exhibition practically accomplish neither.

In accordance with which of those two objects, which may be briefly called *research* and *instruction*, is the main end of the museum, so should the whole be primarily arranged; and in accordance with the object for which each specimen is required, so should it be treated.

The specimens kept for research, for advancement of knowledge, for careful investigations in structure and development, or for showing the minute distinctions which must be studied in working out the problems connected with variations of species according to age, sex, season or locality; for fixing the limits of geographical distribution or determining the range in geological time, must be not only exceedingly numerous (so numerous, indeed, that it is almost impossible to put a limit on what may be required for such purposes), but they must also be kept under such conditions as to admit of ready and close examination and comparison.

If the whole of the specimens really required for enlarging the boundaries of zoological or botanical science were to be displayed in such a manner that each one could be distinctly seen by any visitor sauntering through the public galleries of a museum, the vastness and the expense of the institution would be out of all proportion to its utility; the specimens themselves would be quite inaccessible to the examination of all those capable of deriving instruction from them, and, owing to the injurious effects of continued exposure to light upon the greater number of preserved natural objects, would ultimately lose a large part of their permanent value. Collections of this kind must, in fact, be treated as the books in a library, and be used only for consultation and reference by those who are able to read and appreciate their contents. To demand, as has been ignorantly done, that all the specimens belonging to our national museums, for instance, should be displayed in cases in the public galleries, would be equivalent to asking that every book in a library, instead of being shut up and arranged on shelves for consultation when required, should have every single page framed and glazed and hung on the walls, so that the humblest visitor as he passes along the galleries has only to open his eyes and revel in the wealth of literature of all ages and all countries, without so much as applying to a custodian to open a case. Such an arrangement is perfectly conceivable. The idea from some points of view is magnificent, almost sublime. But imagine the space required for such an arrangement of the national library of books, or, indeed, of any of the smallest local libraries; imagine the inconvenience to the real student, the disadvantages which he would be under in reading the pages of any work fixed in an immovable position beneath a glass case; think of the enormous distances he would often have to traverse to compare a reference or verify a quotation, and the idea of sublimity soon gives place to its usual antithesis. The attempt to display every bird, every insect, shell, or plant which is or ought to be in any of our great museums of reference would produce an exactly similar result.

In the arrangement of collections designed for research, which, of course, will contain all those precious specimens called "types," which must be appealed to through all time to determine the species to which a name was originally given, the principal points to be aimed at are—the preservation of the objects from all influences deleterious to them, espe-

cially dust, light, and damp; their absolutely correct identification, and record of every circumstance that need be known of their history; their classification and storage in such a manner that each one can be found without difficulty or loss of time; and, both on account of expense as well as convenience of access, they should be made to occupy as small a space as is compatible with these requirements. They should be kept in rooms provided with suitable tables and good light for their examination, and within reach of the necessary books of reference on the particular subjects which the specimens illustrate. Furthermore, the rooms should be so situated that the officers of the museum, without too great hindrance to their own work, can be at hand for occasional assistance and supervision of the student, and if collections of research and exhibited specimens are contained in one building, it is obvious that the closer the contiguity in which those of any particular group are placed the greater will be the convenience both of students and curators, for in very few establishments will it be possible to form each series on such a scale as to be entirely independent of the other.

On the other hand, in a collection arranged for the instruction of the general visitor, the conditions under which the specimens are kept should be totally different. In the first place, their numbers must be strictly limited, according to the nature of the subject to be illustrated and the space available. None must be placed too high or too low for ready examination. There must be no crowding of specimens one behind the other, every one being perfectly and distinctly seen, and with a clear space around it. Imagine a picture-gallery with half the pictures on the walls partially or entirely concealed by others hung in front of them; the idea seems preposterous, and yet this is the approved arrangement of specimens in most public museums. If an object is worth putting into a gallery at all it is worth such a position as will enable it to be seen. Every specimen exhibited should be good of its kind, and all available skill and care should be spent upon its preservation and rendering it capable of teaching the lesson it is intended to convey. And here I cannot refrain from saying a word upon the sadly neglected art of taxidermy, which continues to fill the cases of most of our museums with wretched and repulsive caricatures of mammals and birds, out of all natural proportions, shrunken here and bloated there, and in attitudes absolutely impossible for the creature to have assumed while alive. Happily there may be seen occasionally, especially where amateurs of artistic taste and good knowledge of natural history have devoted themselves to the subject, examples enough—and you are fortunate in possessing them in Newcastle—to show that an animal can be converted after death, by a proper application of taxidermy, into a real life-like representation of the original, perfect in form, proportions, and attitude, and almost, if not quite, as valuable for conveying information on these points as the living creature itself. The fact is that taxidermy is an art resembling that of the painter or rather the sculptor; it requires natural genius as well as great cultivation, and it can never be permanently improved until we have abandoned the present conventional low standard and low payment for "bird stuffing," which is utterly inadequate to induce any man of capacity to devote himself to it as a profession.

To return from this digression, every specimen exhibited should have its definite purpose, and no absolute duplicate should on any account be permitted. Above all, the purpose for which each specimen is exhibited, and the main lesson to be derived from it, must be distinctly indicated by the labels affixed, both as headings of the various divisions of the series, and to the individual specimens. A well-arranged educational museum has been defined as a collection of instructive labels illustrated by well-selected specimens.

What is, or should be, the order of events in arranging a portion of a public museum? Not, certainly, as too often happens now, bringing a number of specimens together almost by haphazard, and cramming them as closely as possible in a case far too small to hold them, and with little reference to their order or to the possibility of their being distinctly seen. First, as I said before, you must have your curator. He must carefully consider the object of the museum, the class and capacities of the persons for whose instruction it is founded, and the space available to carry out this object. He will then divide the subject to be illustrated into groups, and consider their relative proportions, according to which he will plan out the space. Large labels will next be prepared for the principal headings, as the chapters of a book, and smaller ones for the various subdivisions. Certain propositions to be illustrated, either in the structure, classification, geographical distribution, geological position, habits, or evolution of the subjects dealt with, will be laid down and reduced to definite and concise language. Lastly will come the illustrative specimens, each of which as procured and prepared will fall into its appropriate place. As it is not always easy to obtain these at the time that they are wanted, gaps will often have to be left, but these, if properly utilized by drawings or labels, may be made nearly as useful as if occupied by the actual specimens.

A public exhibition which is intended to be instructive and interesting must never be crowded. There is, indeed, no reason why it ever should be. Every such exhibition, whether on a large or small scale, can only contain a representative series of specimens, selected with a view to the needs of the particular class of persons who are likely to visit the gallery, and the numbers of specimens exhibited should be adapted to the space available. There is, therefore, rarely any excuse for filling it up in such a manner as to interfere with the full view of every specimen shown. A crowded gallery, except in some very exceptional circumstances, at once condemns the curator, as the remedy is generally in his own hands. In order to avoid it he has nothing to do but sternly to eliminate all the less important specimens. If any of these possess features of historical or scientific interest demanding their permanent preservation, they should be kept in the reserve collections; if otherwise, they should not be kept at all.

The ideal public museums of the future will, however, require far more exhibition space than has hitherto been allowed; for though the number of specimens shown may be fewer than is often thought necessary now, each will require more room if the conditions above described are carried out, and especially if it is thought desirable to show it in such a manner as to enable the visitor to realize something of the wonderful complexity of the adaptations which bring each species into harmonious relation with its surrounding conditions. Artistic reproductions of natural environments, illustrations of protective resemblances, or of special modes of life, all require much room for their display. This method of exhibition, wherever faithfully carried out, is, however, proving both instructive and attractive, and will doubtless be greatly extended.

Guide-books and catalogues are useful adjuncts, as being adapted to convey fuller information than labels, and as they can be taken away for study during the intervals of visits to the museum, but they can never supersede the use of labels. Anyone who is in the habit of visiting picture-galleries where the names of the artists and the subject are affixed to the frame, and others in which the information has in each case to be sought by reference to a catalogue,

must appreciate the vast superiority in comfort and time-saving of the former plan.

Acting upon such principles as these, every public gallery of a museum, whether the splendid saloon of a national institution or the humble room containing the local collection of a village club, can be made a centre of instruction, and will offer interests and attractions which will be looked for in vain in the majority of such institutions at the present time.

One of the best illustrations of the different treatment of collections intended for research or advancement of knowledge, and for popular instruction or diffusion of knowledge, is now to be seen in Kew Gardens, where the admirably constructed and arranged herbarium answers the first purpose, and the public museums of economic botany the second. A similar distinction is carried out in the collections of systematic botany in the natural history branch of the British Museum, with the additional advantage of close contiguity; indeed, as an example of a scheme of good museum arrangement (although not perfect yet in details) I cannot do better than refer to the upper story of the east wing of that institution. The same principles, little regarded in former times in this country, and still unknown in some of the largest continental museums, are gradually pervading every department of the institution, which, from its national character, its metropolitan position, and exceptional resources, ought to illustrate in perfection the ideal of a natural history museum. In fact, it is only in a national institution that an exhaustive research collection in all branches of natural history, in which the specialist of every group can find his own subject fully illustrated, can or ought to be attempted.

As the actual comparison of specimen with specimen is the basis of zoological and botanical research, and as work done with imperfect materials is necessarily imperfect in itself, it is far the wisest policy to concentrate in a few great central institutions, the number and situation of which must be determined by the population and the resources of the country, all the collections, especially those containing specimens already alluded to as so dear to the systematic naturalist, known as author's "types," required for original investigations. It is far more advantageous to the investigator to go to such a collection and take up his temporary abode there, while his research is being carried out, with all the material required at his hand at once, than to travel from place to place and pick up piecemeal the information he requires, without opportunity of direct comparison of specimens.

I do not say that collections for special study, and even original research, should not, under particular circumstances and limitations, be formed at museums other than central national institutions, or that nothing should be retained in provincial museums but what is of a directly educational or elementary nature. A local collection, illustrating the fauna and flora of the district, should be part of every such museum; and this may be carried to almost any amount of detail, and therefore in many cases it would be very unadvisable to exhibit the whole of it. A selection of the most important objects may be shown under the conditions described above, and the remainder carefully preserved in cabinets for the study of specialists.

It is also very desirable in all museums, in order that the exhibited series should be as little disturbed as possible in arrangement, and be always available for the purpose for which it is intended, that there should be, for the use of teachers and students, a supplementary set of common objects, which, if injured, could be easily replaced. It must not be forgotten that the zealous investigator and the conscientious curator are often the direst antagonists; the one endeavours to get all the knowledge he can out of a specimen, regardless of its ultimate fate, and even if his own eyes alone have the advantage of it; the other is content if a limited portion only is seen, provided that can be seen by everyone both now and hereafter.

Such, then, is the primary principle which ought to underlie the arrangement of all museums—the distinct separation of the two objects for which collections are made; the publicly exhibited collection being never a store-room or magazine, but only such as the ordinary visitor can understand and profit by, and the collection for students being so arranged as to afford every facility for examination and research. The improvements that can be made in detail in both departments are endless, and to enter further into their consideration would lead me far beyond the limits of this address. Happily, as I said before, the subject is receiving much attention.

I would willingly dwell longer upon it—indeed I feel that I have only been able to touch slightly and superficially upon many questions of practical interest, well worthy of more detailed consideration—but time warns me that I must be bringing this discourse to a close, and I have still said nothing in reference to subjects upon which you may expect some words on this occasion. I mean those great problems concerning the laws which regulate the evolution of organic beings, problems which agitate the minds of all biologists of the present day, and the solution of which is watched with keen interest by a far wider circle—a circle, in fact, coincident with the intelligence and education of the world. Several communications connected with these problems will be brought before the sectional meeting during the next few days, and we shall have the advantage of hearing them discussed by some of those who by virtue of their special attention to and full knowledge of these subjects are most competent to speak with authority. It is therefore for me rather delicate ground to tread upon, especially at the close of a discourse mainly devoted to another question. I will, however, briefly point out the nature of the problems and the lines which the endeavour to solve them will probably take, without attempting to anticipate the details which you will doubtless hear most fully and ably stated elsewhere.

I think I may safely premise that few, if any, original workers at any branch of biology appear now to entertain serious doubt about the general truth of the doctrine that all existing forms of life have been derived from other forms by a natural process of descent with modification, and it is generally acknowledged that to the records of the past history of life upon the earth we must look for the actual confirmation of the truth of a doctrine which accords so strongly with all we know of the present history of living beings.

Professor Huxley wrote in 1875: "The only perfectly safe foundation for the doctrine of evolution lies in the historical, or rather archæological, evidence that particular organisms have arisen by the gradual modification of their predecessors, which is furnished by fossil remains. That evidence is daily increasing in amount and in weight, and it is to be hoped that the comparisons of the actual pedigree of these organisms with the phenomena of their development may furnish some criterion by which the validity of phylogenic conclusions deduced from the facts of embryology alone may be satisfactorily tested."

Palæontology, however, as we all know, reveals her secrets with no open hand. How can we be reminded of this more forcibly than by the discovery announced scarcely three months ago by Professor Marsh of numerous mammalian remains from formations of the Cretaceous period, the absence of which had so long been a source of difficulty to all zoologists? What vistas does this discovery open of future possibilities, and what thorough discredit, if any were needed, does it throw on the value of negative evidence in such matters! Bearing fully in mind

the necessary imperfection of the record we have to deal with, I think that no one taking an impartial survey of the recent progress of palæontological discovery can doubt that the evidence in favour of a gradual modification of living forms is still steadily increasing. Any regular progressive series of changes of structure coinciding with changes in time can of course only be expected to be preserved and to come again before our eyes under such a favourable combination of circumstances as must be of most rare occurrence; but the links, more or less perfect, of many such series are continually being revealed, and the discovery of a single intermediate form is often of immense interest as indicating the path along which the modification from one apparently distinct form to another may have taken place.

Though palæontology may be appealed to in support of the conclusion that modifications have taken place as time advanced, it can scarcely afford any help in solving the more difficult problems which still remain as to the methods by which the changes have been brought about.

Ever since the publication of what has been truly described as the "creation of modern natural history," Darwin's work on the "Origin of Species," there has been no little controversy as to how far all the modifications of living forms can be accounted for by the principle of natural selection or preservation of variations best adapted for their surrounding conditions, or whether any, and if so what, other factors have taken part in the process of organic evolution.

It certainly cannot be said that in these later times the controversy has ended. Indeed, those who are acquainted with scientific literature must know that notes struck at the last annual meeting of this association produced a series of reverberations, the echoes of which have hardly yet died away.

Within the last few months also two important works have appeared in our country, which have placed in an accessible and popular form many of the data upon which the most prevalent views on the subject are based.

The first is "Darwinism: an Exposition of the Theory of Natural Selection, with some of its Applications," by Alfred Russel Wallace. No one could be found so competent to give such an exposition of the theory as one who was, simultaneously with Darwin, its independent originator, but who, by the title he has chosen no less than by the contents of the book, has, with rare modesty and self-abnegation, transferred to his fellow labourer all the merit of the discovery of what he evidently looks upon as a principle of overwhelming importance in the economy of nature; "supreme," indeed, he says, "to an extent which even Darwin himself hesitated to claim for it."

The other work I refer to is the English translation of the remarkable "Essays upon Heredity and Kindred Biological Problems," by Dr. August Weissman, published at the Oxford Clarendon Press, in which is fully discussed the very important but still open question—a question which was brought into prominence at our meeting at Manchester two years ago—of the transmission or non-transmission to the offspring of characters acquired during the lifetime of the parent.

It is generally recognized that it is one of the main elements of Darwin's, as well as of every other theory of evolution, that there is in every individual organic being an innate tendency to vary from the standard of its predecessors, but that this tendency is usually kept under the sternest control by the opposite tendency to resemble them, a force to which the terms "heredity" and "atavism" are applied. The causes of this initial tendency to vary, as well as those of its limits and prevailing direction, and the circumstances which favour its occasional bursting through the constraining principle of heredity offer an endless field for speculation. Though several theories of variation have been suggested, I think that no one would venture to say we have passed beyond the threshold of knowledge of the subject at present.

Taking for granted, however, as we all do, that this tendency to individual variation exists, then comes the question, What are the agents by which, when it has asserted itself, it is controlled or directed in such a manner as to produce the permanent or apparently permanent modifications of organic structures which we see around us? Is "survival of the fittest" or preservation by natural selection of those variations best adapted for their surrounding conditions (the essentially Darwinian or still more essentially Wallacian doctrine) the sole or even the chief of these agents? Can isolation, or the revived Lamarckian view of the direct action of the environment, or the effects of use or disuse accumulating through generations, either singly or combined, account for all? or is it necessary to invoke the aid of any of the numerous subsidiary methods of selection which have been suggested as factors in bringing about the great result?

Anyone who has closely followed these discussions, especially those bearing most directly upon what is generally regarded as the most important factor of evolution—natural selection, or "survival of the fittest"—cannot fail to have noticed the appeal constantly made to the advantage, the utility, or otherwise of special organs or modifications of organs or structures to their possessors. Those who have convinced themselves of the universal application of the doctrine of natural selection hold that every particular structure or modification of structure must be of utility to the animal or plant in which it occurs, or to some ancestor of that animal or plant, otherwise it could not have come into existence; the only reservation being for cases which are explained by the principle which Darwin called "correlation of growth." Thus the extreme natural selectionists and the old-fashioned school of teleologists are so far in agreement.

On the other hand, it is held by some that numerous structures and modifications of structures are met with in nature which are manifestly useless; it is even confidently stated that there are many which are positively injurious to their possessor, and therefore could not possibly have resulted from the action of natural selection of favourable variations. Organs or modifications when in an incipient condition are especially quoted as bearing upon this difficulty. But here, it seems to me, we are continually appealing to a criterion by which to test our theories of which we know far too little, and this (though often relied upon as the strongest) is, in reality, the weakest point of the whole discussion.

Of the variations of the form and structure of organic bodies we are beginning to know something. Our museums, when more complete and better organized, will teach us much on this branch of the subject. They will show us the infinite and wonderful and apparently capricious modifications of form, colour, and of texture to which every most minute portion of the organization of the innumerable creatures which people the earth is subject. They will show us examples of marvellously complicated and delicate arrangements of organs and tissues in many of what we consider as almost the lowest and most imperfectly organized groups of beings with which we are acquainted. But as to the use of all these structures and modifications in the economy of the creatures that possess them, we know, I may almost say, nothing, and our museums will never teach us these things. If time permitted I might give numerous examples in the most familiar of all animals, whose habits and actions are matters of daily observation, with whose life-history we are as well acquainted almost as we are of our own, of structures the purposes of which are still most doubtful. There are many such even in the composi-

tion of our own bodies. How, then, can we expect to answer such questions when they relate to animals known to us only by dead specimens, or by the most transient glimpses of the living in a state of nature, or when kept under the most unnatural conditions in confinement? And yet this is actually the state of our knowledge of the vast majority of the myriads of living beings which inhabit the earth. How can we, with our limited powers of observation and limited capacity of imagination, venture to pronounce an opinion as to the fitness or unfitness for its complex surroundings of some peculiar modification of structure found in some strange animal dredged up from the abysses of the ocean, or which passes its life in the dim seclusion of some tropical forest, and into the essential conditions of whose existence we have at present no possible means of putting ourselves in any sort of relation?

How true it is that, as Sir John Lubbock says, "We find in animals complex organs of sense richly supplied with nerves, but the functions of which we are as yet powerless to explain. There may be fifty other senses as different from ours as sound is from sight; and even within the boundaries of our own senses there may be endless sounds which we cannot hear, and colours as different as red from green of which we have no conception. These and a thousand other questions remain for solution. The familiar world which surrounds us may be a totally different place to other animals. To them it may be full of music which we cannot hear, of colour which we cannot see, of sensations which we cannot conceive."

The fact is that nearly all attempts to assign purposes to the varied structures of animals are the merest guesses and assumptions. The writers on natural history of the early part of the present century, who "for every why must have a wherefore," abound in these guesses, which wider knowledge shows to be untenable. Many of the arguments for or against natural selection, based upon the assumed utility or equally assumed uselessness of animal and vegetable structures, have nothing more to recommend them. In fact, to say that any part of the organization of an animal or plant, or any habit or instinct with which it is endowed, is useless, or even injurious, seems to me an assumption which, in our present state of knowledge, we are not warranted in making. The time may come when we shall have more light, but infinite patience and infinite labour are required before we shall be in a position to speak dogmatically on these mysteries of nature—labour not only in museums, laboratories and dissecting-rooms, but in the homes and haunts of the animals themselves, watching and noting their ways amid their natural surroundings, by which means alone we can endeavour to penetrate the secrets of their life-history. But until that time comes, though we may not be quite tempted to echo the despairing cry of the poet, "Behold, we know not anything," a frank confession of ignorance is the most straightforward, indeed the only honest position we can assume when questioned on these subjects.

However much we may be convinced of the supreme value of scientific methods of observation and of reasoning, both as mental training of the individual and in the elucidation of truth and advancement of knowledge generally, it is impossible to be blind to the fact that we who are engaged with the investigation of those subjects which are commonly accepted as belonging to the domain of physical science are unfortunately not always, by virtue of being so occupied, possessed of that most precious gift, "a right judgment in all things."

No one intimately acquainted with the laborious and wavering steps of scientific progress (I can answer at least for one branch of it) can look upon that progress with a perfect feeling of satisfaction.

Can it be said of any of us that our observations are always accurate, the materials on which they are based always sufficient, our reasoning always sound, our conclusions always legitimate? Is there any subject, however limited, of which our knowledge can be said to have reached finality?

Or if it happens to any of us as to

> "A man who looks at glass
> On it may stay his eye,
> Or if he pleases through it pass
> And then the heavens espy,"

are not those heavens which are beyond the immediate objects of our observation coloured by our prejudices, prepossessions, emotions, or imagination, as often as they are defined by any profound insight into the depth of nature's laws? In most of these questions an open mind and a suspended judgment appear to me the true scientific position, whichever way our inclinations may lead us.

For myself, I must own that when I endeavour to look beyond the glass, and frame some idea of the plan upon which all the diversity in the organic world has been brought about, I see the strongest grounds for the belief, difficult as it sometimes is in the face of the strange, incomprehensible, apparent defects in structure, and the far stranger, weird, ruthless savagery of habit, often brought to light by the study of the ways of living creatures, that natural selection, or survival of the fittest, has, among other agencies, played a most important part in the production of the present condition of the organic world, and that it is a universally acting and beneficent force continually tending towards the perfection of the individual, of the race, and of the whole living world.

I can even go further and allow my dream still thus to run:—

> "Oh yet we trust that somehow good
> Will be the final goal of ill,—
>
> "That nothing walks with aimless feet,
> That not one life shall be destroyed
> Or cast as rubbish to the void
> When God hath made the pile complete."

ADDRESS TO THE CHEMICAL SECTION.

BY SIR LOWTHIAN BELL, BART., F.R.S., F.C.S., D.C.L., M.INST.C.E.

It has occasionally been the practice of former occupants of this chair to devote a considerable portion of the presidential address to the more recent discoveries in chemical science. This branch of learning advances now with such rapid strides and covers so wide a field, that no one who has not made it the business of his life can hope to discharge this duty with even a moderate share of success.

My immediate predecessor, indeed, discouraged any further attempts in this direction on the ground of the impossibility of doing it justice within the limits of a short discourse, and his remarks were consequently directed to the best methods of teaching the science with which Section B is more directly concerned. I propose this morning to add my testimony to the importance of Dr. Tilden's recommendation, by comparing the rate of progress of one of our great national industries as it has been advanced with and without the aid which chemistry is capable of affording. For this purpose I have selected the metallurgy of iron, not only from my greater familiarity with its details, but because, in my judgment, it affords a suitable example for the object I have in view.

It is needless to insist on the disadvantage attending the application of a science to practical work, without a fair knowledge of the principles which regulate its action. At the same time it would be unfair to those who were engaged in the manufacture of iron during

the first half of the present century to deny the value of the services they rendered to their art, without giving much thought to the laws of nature upon which their processes depended. The work so performed sufficed, nevertheless, to place the world in possession of the metal in such abundance and at so low a cost that no engineering works have been delayed on account of the high price of or absence of the required quality in the produce of our ironworks during the period in question. On the other hand it is not to be denied that since the iron-masters have allied themselves with the chemist they have made more progress in thirty years than their predecessors did in three centuries.

No one unacquainted with the archæology of the iron trade could suppose that the colossal furnaces pouring forth their streams of molten metal, followed by the rapid action of the Bessemer converter, were the modern representatives of the iron-making appliances of former days. Out of the latter, in a low hearth not larger than a domestic fire-place, often dependent on the wind for their blast, a few pounds of ore were at a considerable cost for labour, fuel, and waste of metal, converted into malleable iron. By means of a modern furnace, in an hour and a half a 10-ton converter can be filled with liquid cast iron, which in twenty minutes may be run into ingots cheaper, stronger, and more malleable than the best wrought iron of our ancestors, or indeed of our own manufacture.

How out of the small fire of the ancient ironworks the German Stück-Ofen was evolved is a matter of conjecture. In both, owing to the conditions under which the fuel was burnt, carbon dioxide was largely the product of its combustion. The oxidizing property of this gas was in each the cause of the waste of metal just spoken of. Probably, and for other reasons than avoiding this loss of iron, attempts were made to increase the dimensions of the Stück-Ofen. If this addition were one of limited extent, the smelter would find, to his cost, that a substance was obtained which no longer possessed the malleable property of that obtained from the lesser furnace. This change would be due to the absorption of carbon, but not in sufficient quantity to constitute that valuable form of the metal known as cast iron. With a material useless for the smith and incapable from its difficult fusibility of being run into moulds, we can understand the delay which took place in the introduction of the blast furnace which about the middle of the sixteenth century gave to cast iron a recognized and valuable position in the arts.

In those days there was no very exact science to appeal to, for two hundred and fifty years after the "high furnace" of the Germans and French had been set to work, Fourcroy in his 'General System of Chemical Knowledge and its Application to the Phenomena of Science and Art,' arrived at the conclusion that cast metal was erroneously supposed to be a mixture of slag and iron or a compound of arsenic or manganese and iron. This was written in 1804 in a work of five thousand pages, when he leant to the opinion that Monge and Berthollet were more correct in considering the product of the blast furnace as consisting of iron, oxygen and carbon.

When the malleable iron-maker had placed in his hands a material containing, as the pig did, more than 90 per cent. of metal, he found it greatly to his advantage to avoid having to deal with all the earthy matter contained in the ores, for it was the presence of silica and alumina which helped to add to the waste incurred in the old hearths. The object sought for in the old Catalan fires, as they were called, in treating ore was one of a reducing or deoxidizing character, whereas the reverse of this was required when ore was replaced by pig-iron. In the first, oxygen had to be removed from the oxide of iron, in the latter oxygen had to be united with the metalloids found in the pig. These were distinctions unknown in the days we are considering, and therefore did not trouble the minds of the iron-masters. In both cases there was a large formation of oxide of iron, and when pig-iron was handed over to the Catalan furnace man, it was the oxide of iron so generated which performed the desired duty, and thus this simple mode of procuring malleable iron remained undisturbed for upwards of two hundred years.

The discovery which led to the discontinuance of the low blast furnace as a means of procuring iron in its malleable form was that of puddling made by Cort in 1784. In point of fact Cort's process was merely doing in a reverberatory furnace that which was previously effected by means of compressed air. In an economic point of view, however, the difference is great, and its consequences were of immense importance, for to the puddling furnace we were first indebted for an ample supply of cheap iron by which, in a variety of well-known ways, the interests of the human race have been so largely promoted. As an indication of the indifference of those formerly engaged in industrial pursuits to the scientific aspect of their calling, may be mentioned the fact that puddling had been largely followed for upwards of half a century before it occurred to any one to examine the chemistry of the process.

Down to the beginning of the seventeenth century the only fuel used in the blast furnace, and, indeed, in the manufacture of iron generally, was charcoal. In 1620 Dudley made several attempts to substitute mineral coal for vegetable fuel in his smelting works, which, by the exhaustion of timber, had become very expensive. He failed in this, and in consequence the British iron trade gradually fell until it was not equal to the production of one modern blast furnace. This happened in 1740, when Darby, by treating pit coal in the same fashion as the charcoal burners had done with wood, *i.e.*, by charring it, restored vitality to an expiring industry. It is true the restoration must have been of a languid character, for in half a century afterwards it is said the weekly produce of a furnace did not exceed 15 or 16 tons.

Various changes were introduced into the manufacture of iron in the first quarter of the present century, but these were rather of a mechanical than of a chemical nature. They chiefly owed their origin to the lessons taught by the chemist Black to James Watt, who profited by them in the application of steam as a motive power. This brings us to the year 1828, a year which will always be distinguished in the annals of the iron trade, by the discovery of Neilson of the value of heated air in smelting the ores of this metal. I never heard it pretended that this inventor had any pretensions to be considered a man of science. Had it been otherwise, the knowledge of the virtues of the hot blast might have been indefinitely postponed, and this opinion is founded on the fact that for many a long year no satisfactory explanation was given why heat obtained by burning coal in the hot air apparatus was capable of saving three or four times its weight in the fuel consumed in the furnace itself. I propose, with your permission, to consider this subject with more attention than I shall devote to other portions of this address, and I am led to do this, not only because it is one of some scientific interest, but because its study seems to afford a solution to some questions in respect to which great differences of opinion prevailed among those whose daily work led them to pay much attention to their details. These questions have all a reference to the quantity of fuel consumed in smelting the ore, as this may be affected by the temperature of the blast and the dimensions of the furnaces employed for this purpose.

As is well understood, the heat excited in an iron furnace may be classified under three heads:—

First, that derived from the combustion of the coke at the point where the blast enters the furnace, the ultimate product being carbonic oxide.

Second, the conversion of a portion of this carbonic oxide into carbon dioxide.

Third, the heat carried into the furnace by the blast.

For the better illustration of the relations which the heat derived from these sources bear to each other, a table (No. 1) has been prepared in which the quantities of each are given in centigrade calories, and reckoned upon 20 units of iron to correspond with English weights. The information upon which the calculations are based is derived from actual observation gathered from furnaces of different sizes and fed with air at different temperatures.

A second table contains statements showing the manner in which the heat so generated is appropriated in the various divisions of the duty the furnaces had to perform, and for facility of comparison, alongside the quantities of heat so required, their equivalents in the coke used have been added.

In the Table No. II. the appropriation of the heat is separated into *Constants* and *Variables*. The first consists of items where the quantity of heat in making a particular quality of iron is only liable to alterations of trifling amount. On the other hand the variables exhibit in A and B differences so considerable that work which in the furnace blown with cold air absorbed 73,388 calories per 20 cwts. of pig-iron was done with 58,645 calories by merely raising the blast to 485°.

The cause of this great variation in the amount of heat required for a given weight of pig iron, produced under different circumstances as to temperature of blast and size of furnace, depends on changes in the actual amount of work to be performed. How this arises will be best seen in the description of the four examples set forth in the two tables.

Beginning with A, which is a furnace 48 feet in height, blown with cold air and consuming 45 cwts. of coke and 18 cwts. of limestone per ton of metal, the volume of gas produced may be taken at 14,460 cubic yards at ordinary temperatures and pressures. At the temperature at which they escape we may assume the volume per ton of iron to be about 36,000 cubic yards, passing out of the furnace at the rate of 357 cubic yards per minute.

Table. I.

—	A	—	—	—
Height of furnace in feet.	48	48	80	80
Calories—per unit of coke burnt to CO . .	2078	2028	2018	2045
Calories—from portion of this CO burnt to CO_2.	560	1059	1636	1463
Total calories from coke	2638	3087	3654	3508
Calories in blast. . .	—	508	534	732
Total heat per unit of coke	2638	3595	4188	4240
Temperature of blast C	0°	485°	485°	695°
Cwts. blast per ton of metal	228	128	103	94
Cwts. escaping gases per ton of metal . .	285	170	138	126
Cwts. slag per ton of metal	34	31	29	28

In comparing the consumption of coal formerly burnt in the hot-air stoves with the saving of coke in the furnace, account must be taken of the different conditions of the combustion. In Table I., owing to the small quantity of carbon dioxide formed, the heat evolved is only 2638 calories per unit of coke, whereas each unit of the coal consumed in heating the air afforded three times this quantity of heat. Doubtless there was a great loss in the operation of heating the air, for it would not appear that much above one-

Table II.—Showing the appropriation of Heat and its equivalent per ton Iron.

Appropriation of heat per 20 of pig iron.	A—Blast 0° C.		B—Blast 485° C.		C—Blast 485° C.		D—Blast 695 C.	
	Calories.	Cwts. coke.	Calories.	Cwts. coke.	Calories.	Cwts. coke.	Calories.	Cwts. coke.
CONSTANTS:—								
Reduction of Fe_2O_3 in ore	33,108	12·550	33,108	9·209	33,108	7·905	33,108	7·808
Reduction of metalloids in pig . . .	4,174	1·582	4,174	1·161	4,174	·996	4,174	·984
Dissociation of CO($2CO=C+CO_2$ . .	1,440	·546	1,440	·400	1,440	·344	1,440	·340
Fusion of pig-iron	6,600	2·501	6,600	1·836	6,600	1·576	6,600	1·557
Constant calories per 20 of pig . . .	45,322	—	45,322	—	45,322	—	45,322	—
Coke consumed per 20 of pig . Cwts.	—	17·179	—	12·606	—	10·821	—	10·689
VARIABLES:—								
Evaporation of water in coke. . . .	630	·239	411	·114	312	·074	298	·070
Decomposition of water in blast. . .	5,420	2·055	3,348	·931	2,720	·649	2,408	·568
Expulsion of CO_2 in limestone . . .	6,660	2·526	5,920	1·647	5,054	1·207	4,070	·961
Reduction of CO_2 in limestone to CO .	6,912	2·620	6,144	1·709	5,248	1·254	4,099	·962
Fusion of slag	18,590	7·045	17,325	4·819	16,720	3·993	15,565	3·673
Carried off in escaping gases	29,482	11·178	18,486	5·144	11,043	2·636	8,906	2·101
Heat in tuyère water at hot-blast furnaces, loss from walls, etc. .	5,694	2·158	7,011	1·950	7,057	1·686	9,389	2·216
Variables for 20 of pig	73,388	—	58,645	—	48,154	—	44,735	—
Variables for coke for 20 of pig . Cwts.	—	27·821	—	16·314	—	11,499	—	10·551
SUM OF CONSTANTS AND VARIABLES:—								
Calories for 20 of pig-iron	118,710	—	103,967	—	93,476	—	90,057	—
Cwts. of coke for 20 of pig-iron . . .	—	45·	—	28·92	—	22·32	—	21·24

fourth of the theoretical quantity of heat capable of being generated by the coal reached the furnace through the tuyères.

We have now to consider the nature of the change which is effected in a furnace where, for every 2638 calories generated by the combustion of the coke, 508 calories are carried in by the blast. It will be readily understood that with the velocity at which the gases are passing out of the cold-blast furnace they have but little time to impart their heat to the incoming solids, or to have the carbonic oxide they contain converted into carbon dioxide. The withdrawal of so much coke, and its place taken by heat contained in the blast, means that the 14,460 cubic yards of escaping gases are reduced to about 12,120 cubic yards. The effect of this is not only to alter the speed at which the gases are passing through the materials, but to alter the relation in point of quantity which the ironstone present in the furnace bears to the coke, so that in point of fact a larger space is occupied by the ore than was before, and a lesser one by the fuel. We have thus the carbonic oxide passing more slowly over the oxide of iron at the same time than there is a greater quantity of the oxide exposed to the influence of the reducing gas. To illustrate how this operates, a table has been prepared showing how each 1000 cubic feet of furnace space is occupied in the four cases we are considering:—

	A. 48 ft. cold blast.	B. 48 ft. hot blast.	C. 80 ft. blast.	D. 80 ft. blast.
Coke cubic feet	736	686	590	590
Limestone „	63	75	86	77
Ironstone „	201	239	324	333
	1000	1000	1000	1000

The immediate effect of the introduction of the hot blast is to alter the spaces filled by the three minerals from those given in column A to coke 686, limestone 75 and ore 239 cubic feet. This is followed by a two-fold advantage. Volume for volume, ore and limestone possess double the heat-intercepting power of coke, and there is 19 per cent. more ore ready to oxidize the carbonic oxide passing over it at a reduced speed of 16 per cent. than there was when using cold air. The increased efficiency of the coke, due to a more perfect cooling of the gases and higher oxidation of the carbonic oxide, permits its further suppression until the relative spaces filled by the materials are those shown under Column B. These advantages would not of themselves suffice to save 16 cwt. of coke or thereabouts out of 45 cwts., but the reduction in the coke consumed is followed by a diminution in the quantity of air used and in the weight of gases and slag produced. A reference to the appropriation of heat classified under the head of variables will show in consequence diminution from 73,338 to 54,643 calories.

It may be asked whether this prolonged exposure of the ore to the reducing gases could not be secured by driving the furnace at a slower speed. There is, however, a point which may be regarded as one of equilibrium, in which the quantity of cold material charged at the top just suffices to reduce the temperature of the gases, leaving it as far as is possible consistent with the dimensions of the furnace. If the volume of blast entering at the tuyères is lowered one-half it would mean that the materials would be exposed for twice the time to the hot gases they were previous to the alteration in the rate of driving. The elevation in the temperature of the coke would enable its carbon to act on the carbon dioxide, so that there would ensue as great a loss under the second head of heat evolution in Table I., as there is gained by a more perfect interception of the heat contained in the gases.

(*To be concluded.*)

Obituary.

Notice has been received of the death of the following:—

On the 30th of August, Mr. Thomas Samuel Saunders, Chemist and Druggist, 76, New Bond Street, London. Aged 38 years. Mr Saunders was an Associate of the Society in business.

On the 31st of August, Mr. Alfred Gower, Chemist and Druggist, Tunbridge, Kent. Aged 65 years. Mr. Gower had been a Member of the Pharmaceutical Society since 1871.

On the 1st of September, Mr. Alfred Ball, Pharmaceutical Chemist, High Street, Loughborough. Aged 48 years.

On the 3rd of September, Mr. John Thomas Abbott, Chemist and Druggist, Chelsworth House, Darlington. Aged 65 years.

On the 4th of September, Mr. John Clapton, Chemist and Druggist, Chester Street, Coventry. Aged 42 years.

On the 6th of September, Mr. John Davies, Chemist and Druggist, Claverton Street, Pimlico, London. Aged 68 years.

On the 14th of September, Mr. William Young, Pharmaceutical Chemist, Atlantic Road, Brixton. Aged 53 years. Mr. Young was a Life Member of the Pharmaceutical Society, having joined it in 1866.

On the 15th of September, Mr. Henry Sagar, Pharmaceutical Chemist, Caledonian Road, Leeds. Aged 74 years. Mr. Sagar had been a Member of the Pharmaceutical Society since 1853.

On the 17th of September, Mr. George Pearmain Chifney, Chemist and Druggist, High Street, Mildenhall, Suffolk. Aged 32 years. Mr. Chifney was an Associate of the Pharmaceutical Society.

On the 18th of September, Mr. Richard Shillito, Chemist and Druggist, Holbeck, Leeds. Aged 65 years.

On the 18th of September, at his residence, 38, Talgarth Road, West Kensington, Mr. John George Shirley, Pharmaceutical Chemist, of Westbourne Place, Bayswater. Aged 68 years. Mr. Shirley was a Life Member and a Founder of the Pharmaceutical Society, having joined it in 1841.

Correspondence.

THE ALCOHOLIC STRENGTH OF THE B.P. TINCTURES.

Sir,—In the discussion which followed the reading of Mr. Proctor's paper on "Tincture of Senna" at the Conference, more than one speaker made allusion to the need there is for the introduction of greater variety in the strength of the alcoholic menstrua employed in the preparation of the pharmacopœial tinctures.

Bearing upon this subject I may say that more than twelve months ago, I made every drug tincture in the B.P. with alcohol of four different strengths, with the object of ascertaining whether the strength of the alcohol employed might not in some cases be modified with advantage. Up to the present I have been unable from want of time to estimate more than a few of them, but propose now to continue my experiments, and publish the results when the investigation is complete. R. WRIGHT.

J. F. Smith.—We are unable to furnish you with the information asked for.

H. G. Robinson.—The 'Druggists' Circular' is published by W. O. Allison, 72, William Street, New York; the 'Western Druggist,' by Engelhard and Co., Chicago; and the 'Drug Clerk's Journal' at 175, Dearborn Street, Chicago.

Ajax.—No doubt such employment could be obtained, especially if you make use of the advertising sheets.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Twigg, Proctor, Thresh, Groves, Salmon, Dott, Reynolds, Clague.

"THE MONTH."

New Sugar Compounds.

A recent observation made by Professor E. Fischer appears to open up quite a new field for investigation in connection with the group of sugars. The reduction of a carboxyl group in an acid to an aldehyd group, through the agency of nascent hydrogen, has been frequently attempted without success. But Professor Fischer has found that this reaction can be effected in the acids of the sugar group with great ease by means of sodium amalgam (*Berichte*, xxii., 2204). Thus, for instance, gluconic acid, the oxidation product of glucose, when treated in cold aqueous solution with sodium amalgam, and neutralized from time to time with sulphuric acid, is readily reduced, yielding a sugar that reduces Fehling's solution and is probably identical with dextrose. Killiani has already shown that the known glucoses can by treatment with hydrocyanic acid be converted into the corresponding carbonic acid containing one more atom of carbon, and such a compound is now shown to be reducible to another of the sugar type also containing more carbon. It is believed that this process can be repeated, yielding a series of "sugars" increasingly rich in carbon.

Iodized Phenols: Annidalin.

The reactions that take place between iodine and compounds of the phenol group in the presence of an alkali have been studied by Messrs. Messinger and Vortmann, who describe a number of new compounds, one of which it is intended to introduce into medicine as a substitute for iodoform (*Berichte*, xxii., 2312). Upon adding solution of iodine in potassium iodide to an alkaline solution of phenol, in the proportions of eight atoms of iodine to one molecule of phenol and four molecules of potassium hydrate, and heating the mixture to 50° or 60° C., a dark red non-crystalline precipitate falls, which has the composition of diodphenoliodide ($C_6H_3I_2{\cdot}OI$), and is apparently isomeric with the already known white triodphenol, into which it is easily converted by boiling in potash solution and reprecipitation from solution by an acid. When dry the new compound is violet coloured, odourless, insoluble in water and dilute acids, soluble in alcohol with a red colour, and freely soluble in benzol and chloroform. The cresols form analogous compounds. Thymol combines in the proportion of three atoms of iodine to two molecules of thymol, the product being probably a dithymol compound. When properly prepared it is red and will retain this colour several months if kept dry and protected from light; but in contact with moisture it is readily decomposed, giving off iodine and passing into a pale yellow compound containing only two atoms of iodine to the double molecule of thymol. It is the red compound apparently which it is proposed to introduce as a substitute for iodoform, under the name "annidalin." It is described as being amorphous, insoluble in water, slightly soluble in alcohol and freely soluble in ether and chloroform. Resorcin treated similarly yields a diiodresorcin iodide, while the oxybenzoic acids form alkali salts of corresponding di-iodized acids, the compound with salicylic acid being represented by the formula $C_6H_3I\begin{cases}OI\\COOK,\end{cases}$ and containing 59·3 per cent. of iodine.

At the pharmaceutical exhibition held in connection with the recent meeting of the Deutsche

Synthetic Carbolic Acid.

Apotheker-Verein considerable interest was excited in a sample of "synthetic carbolic acid,' an article now being sent out by the Badische Anilin- und Soda-Fabrik. This acid is claimed to be chemically pure, and consequently absolutely free from the impurities derived from tar with which the best qualities of carbolic acid hitherto available have been contaminated. It differs from ordinary carbolic acid in having a higher melting-point (41° to 42° C. against 35° to 37° C.), and in having a "weak pure smell" which does not in the least resemble that of tar, a 5 per cent. solution in water being hardly recognizable by its odour. It is described as boiling at 181° C. if the thermometer be enveloped in the vapour, as being entirely anhydrous, and as giving a clear solution in water. Apart from the advantages presented by so pure an article as this is represented to be when used for medicinal purposes it seems obvious that it would prove a superior material for the manufacture of artificial salicylic acid. It will also be interesting to note whether in the absence of the usual impurities the well-known red coloration of the acid after exposure takes place.

Phenolated Celluloid.

Under the name "phenolated celluloids" M. Desesquelle describes a class of preparations that may possibly find useful application as dressings for wounds (*Répertoire*, Aug. 10, p. 338). They are made by macerating pharmaceutical gun cotton at the ordinary temperature in one of the liquids formed by the combination of a phenol with camphor. The pyroxylin gradually swells, and by agitation of the mixture there is obtained a kind of homogeneous paste, more or less viscous according to the proportions employed, and resembling collodion. When spread upon a level surface this liquid forms after a time, through the evaporation of the camphor, a very adherent solid and transparent varnish.

Suggestion as to Nomenclature.

Considering the puzzling diversity of names applied to the ever increasing number of antipyretics and other synthetic compounds that are being introduced into medicine, a suggestion made in the July number of *Merck's Bulletin* for their reduction to something like order is worthy of attention. The group taken as an illustration includes the compounds known under the trivial names "antifebrin," "antisepsin," "exalgin," "methacetin," and "phenacetin," and it is proposed that the last four should bear names showing their relation to the first, that being now a well-known compound of recognized therapeutic properties. Thus, since antifebrin has the chemical constitution of phenylacetamide, and antisepsin that of bromphenylacetamide, or phenylacetamide in which an atom of bromine occupies the place of an atom of hydrogen, it is suggested that antisepsin would be more conveniently designated as "bromated antifebrin." In like manner, exalgine being methylphenylacetamide, or phenylacetamide with an atom of hydrogen substituted by a methyl group, it is suggested that it should be called "methylated antifebrin." Methacetin, it is claimed, could be correctly described as oxymethylphenylacetamide, and phenacetin as oxyethylphenylacetamide, or phenylacetamides in which an atom of hydrogen has been substituted by an oxymethyl or an oxyethyl group

respectively, and accordingly it is proposed that the former be called "oxymethylated antifebrin' and the latter "oxyethylated antifebrin." Other close relations between the new compounds have been pointed out in this Journal on various occasions. It is obvious that the new names suggested are themselves not free from objection as being more cumbersome than those they are to displace, to say nothing of their hybrid character; but it is claimed that the characters and properties of antifebrin being now common knowledge, the names proposed would be usefully suggestive to chemists and therapeutists as to the nature and properties of the compounds that bear them. The question of proprietary rights in advertised names would also probably interfere to some extent with even so desirable a change as the substitution of a systematic terminology for the present aimless and haphazard one.

Crystallized Ferrous Phospho-Citrate.

At the recent Congress on Therapeutics held in Paris, M. Lecerf brought under notice a sample of crystallized ferrous phosphocitrate (*Répertoire*, Sept. 10, p. 387). The process followed in its preparation was to treat a solution of ferrous sulphate with sodium phosphate in excess, wash the resulting precipitate carefully and then place it in a concentrated solution of ammonium citrate and allow it to stand during four or five days at a temperature of 40° C. At the end of that time the solution, which had become coloured, was decanted and a fresh quantity of solution added, and this was repeated until the solution no longer acquired more than a faint greenish tinge, by which time the precipitate had lost its original blue colour and become white. The precipitate was then thrown upon a filter, washed rapidly first with distilled water and then with alcohol, and dried under shelter from air. The salt appears as a faintly greenish white crystalline powder, soluble in cold water, very soluble in hot water, and insoluble in alcohol. When exposed to the air it peroxidizes readily, and assumes a brown tint that darkens as the oxidation progresses.

Ammonium Iodide.

A useful hint is given by Mr. Falk for the treatment of ammonium iodide that has become decomposed and coloured through keeping (*Am. Journ. Pharm.*, Sept., p. 464). The treatment consists in placing the coloured iodide in a bottle together with a vitreous piece of ammonium carbonate wrapped in filter paper and stoppering the bottle closely. The ammonia disengaged from the unstable carbonate combines with the free iodine in the discoloured sample to reform ammonium iodide, and when this has been effected the ammonium carbonate is removed and the bottle left unstoppered until the excess of ammonia has disappeared.

Cotton-Seed Oil in Olive Oil.

M. Labiche proposes a modification in the process that has been recommended for the recognition of the presence of cotton-seed oil in olive oil by its reaction with nascent lead oxide (*Répertoire*, Aug 10, p. 352). It consists in mixing 10 c.c. of the oil to be examined with 10 c.c. of ether, adding 5 c.c. of a concentrated solution of neutral acetate of lead, shaking, and then pouring in 5 c.c. of solution of ammonia. If cotton-seed oil be present an orange-red colour is produced, and the test is said to be sufficiently delicate to detect an admixture of 5 per cent.

Castor-Oil Chocolate.

As a means of making castor oil palatable, M. Giraud recommends its incorporation with chocolate (*Pharm. Zeit.*, June 22, p. 384). This is done by working up into a mass, on a warm plate, 50 parts of cacao powder freed from oil, 50 parts of castor oil, 100 parts of powdered sugar, and vanilla sufficient for flavouring. The product may then be formed into tablets or pastilles. It will be seen that the castor oil is here made to take the place of the removed cacao fat. About 10 grams of the chocolate is a sufficient dose for a child.

Mandragorine.

In a preliminary note published a few months since (see *Pharm. Journ.*, June 8, p. 989), Herr Ahrens gave some information as to what he believed to be two different alkaloids that he had separated from mandragora root and that appeared to be probably isomers of atropine. Since then he has made further experiments with larger quantities of fresh root from Sicily (said to be derived from *Mandragora vernalis*), Venice and Trieste. Only the Trieste root yielded any alkaloid worth mentioning, but whether this difference depended upon the parcels being derived from different species or being gathered at different stages of growth cannot be stated. Only one alkaloid was detected in this investigation, and this instead of being isomeric with atropine as supposed, appeared to contain more hydrogen. An attempt is being made to prepare a hydride of atropine for the purpose of comparing it with mandragorine. It has been ascertained that solutions of mandragorine and of its salts produce mydriasis when administered internally or applied directly to the eye.

Alkaloids in the Poppy.

Some interesting details have been published recently by M. Clautrian as to the time of the appearance of alkaloids in the *Papaver somniferum* and their localization in the plant (*Journ. Pharm. Chim.*, Aug. 15, p. 161). According to the author the young plant is not poisonous, and not until it has attained a height of five or six inches does it contain appreciable traces of morphine, which then occurs in the whitish latex, but not at the growing point or in the rootlets. The morphine is most abundant just at the time when growth ceases and fat and albuminoids commence to accumulate in the seed. The laticifers containing the alkaloids have a marked tendency in the roots to become localized under the epidermis, but wherever there are laticifers or latex there are to be found morphine and meconic acid, and probably also narcotine, papaverine and codeine. The presence of thebaine is thought doubtful. The alkaloids do not however remain exclusively in the latex: they are to be found also in the epidermal cells, in the small and thick-walled cells of the epidermis of the capsule, in less quantity in those of the epidermis of the peduncle and the leaves, plentifully in the stigmatic cells and in the hairs of the peduncle, especially at their base. They are absent, however, from the epidermis cells of the root and do not seem to occur in the seeds. They persist longest after maturation in the epidermis cells of the capsule, but eventually they entirely disappear.

It was pointed out by Pasteur in his classic work on wine that beer which has been fermented with the wine ferment has the odour of wine. Similarly grape juice fermented under the influence of

beer yeast acquires the odour of beer, and it is now generally recognized that the secretion produced by each yeast during fermentation has an odour peculiar to itself. This has suggested to M. Rommier the possibility of communicating to a common wine the bouquet characteristic of a wine of good quality by changing the agent of fermentation (*Journ. Pharm. Chim.*, Aug. 15, p. 145). Laboratory experiments made upon grape juice sterilized by heat with ellipsoidal ferments taken from different kinds of grapes showed that each variety of ferment is capable of communicating to the fermenting juice its characteristic odour, but a difficulty presented itself in the fundamental changes brought about in the constituents of the juice in the operation of sterilization. It was then observed that wine ferments taken from fermenting liquor multiply more quickly than the spores of yeasts and moulds occurring on the grape skin, and not yet brought into activity. In fact when such active ferment is introduced into the vat at the commencement of a fermentation it develops so rapidly that it quite paralyses the germination of the natural ferments, as long as the temperature remains below 21° or 22° C. Above that temperature the introduced and the native ferments develop side by side, but the former still exercises sufficient influence to modify the bouquet of the resulting wine. Thus the active ellipsoidal ferments from the white wines of Champagne and Buxy, and the red wine of Côte-d'Or, added to a grape juice that ordinarily gives an insipid wine, almost free from bouquet, and kept at a temperature between 22° and 28° C., yielded products that in each case possessed a bouquet resembling that of the wine from the respective district from which the ferment was derived.

Wine Bouquet.

In the September report by Messrs. Gehe and Co. reference is made to the fact that the fine qualities of cubebs formerly imported are at present seldom met with. Most consignments now consist of mixtures of genuine fruit in different stages of maturity, which may, as a rule, be separated without difficulty under the four following types. (1) Small unsightly much shrivelled grey-brown to grey-black fruit, scarcely 2 mm. in diameter, and collected in the first stage of ripening; the stalk one and a half times to twice as long as the fruit; the seed shrivelled and often scarcely perceptible. (2) Fruit grey-black, 4 to 4·5 mm. in diameter, closely, but not very deeply and sometimes only faintly wrinkled; stalk as long as or one and a half times as long as the fruit; part of the seed well-formed and then round, adherent to the base, brown externally, greyish-yellow internally, with a horny appearance towards the circumference, and part shrivelled and of a blacker hue. (3) Fruit 5 mm. and upwards; stalk 5 to 7 mm. long; colour more of a grey-brown; wrinkles deeper and less numerous; seeds mostly developed, spherical, light brown, yellowish-white internally, frequently mealy and seldom horny. (4) Besides the foregoing most parcels contain 5 to 10 per cent. of yellowish fruit, having an easily separable cork-like covering; the fruit-shell is very friable and does not withstand the pressure of the fingers; the seed is undeveloped and adherent to the base as a more or less shapeless mass. Apparently these are genuine fruit that have been affected in their development by fungoid or weather influences. Nos. 1, 2 and 4 are coloured red immediately by concentrated sulphuric acid; No. 3 becomes at first yellow to yellow-brown, and blood red after an hour or more. In addition admixtures of false cubebs are not unfrequently met with; but these can usually be recognized by the seed being adherent to the inner wall of the fruit; in shape they vary, being sometimes round and then usually stalkless, or more pear-shaped and stalked. For pharmaceutical purposes preference is to be given to parcels containing a large proportion of the variety described as No. 2.

Cubebs.

In a communication recently laid before the Vienna Academy of Sciences Messrs. Wiesner and Mollisch have published some interesting results of their joint work in vegetable physiology (*Pharm. Post*, Sept. 22, p. 681). They have found that neither living nor dead vegetable cell-membrane allows dry gases even under pressure to filter through, either when the membrane is dry or when saturated with moisture, but that the movement of gases in plants is a process of diffusion, which goes on more rapidly in proportion as the cell-membrane is saturated with water. The greatest amount of diffusion takes place when the membranes of algæ or of submerged water-plants act as dialytic diaphragms. Carbonic acid diffuses through the membrane more rapidly under similar conditions than hydrogen, oxygen or nitrogen; generally speaking the rapidity with which gases diffuse through the cell-membrane is dependent upon the absorption co-efficient and density of the gas. Further, carbonic acid diffuses out from vegetable cells more rapidly into air than into water and probably the same holds good with other gases.

Passage of Gases through Plants.

In an article in the *American Journal of Pharmacy* (Sept., p. 454) Mr. G. M. Beringer recommends the use of a menstruum consisting of seven volumes of alcohol (sp. gr. 0·820) to one of water as the best for tincture of strophanthus, since the tincture of this strength shows no sign of precipitation even after being kept for a year. To get rid of the oil he prefers to treat the dried and powdered seeds with petroleum ether, sp. gr. 0·6829 at 60° F., in preference to ordinary ether. He also directs attention to the fact, first pointed out by L. Larmuth, and often overlooked, that the bitter principle, when dissolved in water, in a few days undergoes some change and becomes far more toxic than when recently prepared. He recommends, therefore, that the tincture should not be prescribed in aqueous solution. The seeds experimented with by him were those of the Kombé variety. In view, however, of the different kinds of seeds used in commerce under the name of strophanthus seeds, and of the amorphous and crystalline bodies obtained from different seeds by various chemists (see *Pharm. Journ.*, [3], xix., p. 207), it seems doubtful if any real advance can be made in the pharmacy of this drug until the crystalline bodies have been carefully worked out from the chemical side.

Tincture of Strophanthus.

Some experiments with hyoscine prepared by Ladenburg have been undertaken by Messrs. Magnan and Lefort (*Practitioner*, September, p. 219). They find that in doses of $\frac{1}{60}$th of a grain it produces excellent results in acute

Hyoscine.

mania, in five minutes after ingestion. The patient loses his morbid activity and grows silent, then mydriasis and loss of power of accommodation follow, and the patient goes to sleep for five or six hours without further inconvenience. It has also been used successfully in delirium tremens, and in severe local spasms in a child. In view, however, of the facts pointed out by Dr. Mitchell Bruce (*Practitioner*, xxxvii., p. 321) that doses of $\frac{1}{100}$ of a grain may produce symptoms of failure of the heart and Cheyne-Stokes breathing, it may be mentioned that M. Laborde finds that doses of one-tenth the quantity used by Messrs. Magnan and Lefort are sufficient for the purpose.

Royal Salep.

Dr. J. E. T. Aitchison has at length published in the *Annals of Botany* a full account of the badsha, or royal salep, a substance largely used as food in some parts of Afghanistan. This salep was described in a former volume of the *Pharmaceutical Journal*, but its botanical origin was then unknown. Dr. Aitchison recently identified it as a species of *Allium* (figured in the *Botanical Magazine*, t. 6707), *A. Macleani*. It is remarkable that although an *Allium* it does not possess any alliaceous odour. It also presents a remarkable peculiarity in the fact that the innermost scale of the bulb is remarkably fleshy and forms the greater proportion of the bulb, only a few outer scales of a membranous character being present. It does not contain starch, but, as with salep, its properties are due to mucilage.

Berberis Lycium.

In the *Botanical Magazine* for September (t. 7075) Sir J. D. Hooker has given an excellent illustration of the *Berberis Lycium*, which flowered in the Kew Arboretum in June and fruited in September. The extract, which is known in India under the name "rusot," and is identical with the lycium described by Dioscorides, is still esteemed in India as an application in ophthalmia and internally in diarrhœa, dyspepsia and general debility. The history of this ancient drug is given in 'Pharmacographia,' and specimens of the extracts are to be seen in the Museum of the Society at Bloomsbury Square, and of the dried plant in the Hanbury Herbarium.

Oil of Cedar.

According to a note in the *Garden and Forest* the distillation of oil of cedar (*Juniperus Virginiana*), which has long been carried on in the pencil mills at Cedar Keys, in Florida, from sawdust and wood of inferior quality unsuitable for pencil making, is likely to be carried on in other States, since straight-grained timber suitable for pencil making has become scarce in Florida and along the streams of the west coast, where the best used to be found. The supply of cedar timber of suitable quality is said not to be large in proportion to the demand, and not likely to hold out many years longer.

Mentha viridis.

At a meeting of the Scientific Committee of the Royal Horticultural Society on July 23, Professor Henslow called attention to the abundant flowering of *Mentha viridis* during the present season, and stated that the flowers appeared to be all female only, with rudimentary stamens, the plant being apparently, like so many other labiates, gyno-diœcious. At the same meeting Professor Marshall Ward exhibited a specimen of mint showing spiral torsion, the leaves becoming alternate in a secund manner by a twist through a semicircle and not by a development of internodes (*Gard. Chron.*, Aug. 10, p. 168).

The Pharmaceutical Journal.

SATURDAY, SEPTEMBER 28, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

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OPENING OF THE NEW SESSION.

WITH the advent of October scholastic and most other holidays come to an end, and professional and business men, professors and pupils, have to put on the harness for a fresh spell of work. The medical schools, as a rule, signalize the opening of the month with inaugural addresses, and following an honoured custom the Pharmaceutical Society of Great Britain has for several years past secured the kindly services of some eminent man to address words of encouragement and advice to the incoming and outgoing students in its School of Pharmacy. For many years in succession this office was filled by leading pharmacists, but more recently the Council has gone further afield and has obtained on several occasions the sympathetic help of men of world-wide reputation in the medical and allied sciences. This year, at the inaugural sessional meeting that will be held in the Society's House on Wednesday evening next, the students are for a second time to be addressed by a President of the General Medical Council, Professor JOHN MARSHALL, F.R.S., having kindly undertaken to perform the duty on that occasion. The presentation by the Professors and Teachers of their reports on the work done by the students of the previous session, and the Distribution of Prizes to successful students by the President, always precede the address on these evenings, and as they invariably evoke intense interest, and as the invitation to be present is extended by the Council to all the students and their friends, ladies as well as gentlemen, it is hardly necessary to bespeak for Professor MARSHALL a full audience. But we are sure that all present, to say nothing of many who will be unable to attend, will appreciate at its proper value the presence and advice of the President of the Medical Council.

Although most students intending to put themselves under pharmaceutical tuition during the coming session will have already made their arrangements, it will not be inopportune to call attention to some of the principal arrangements in the School of Pharmacy carried on in the Society's premises, which will be brought into such prominence by the proceedings of the evening.

Briefly, they are as follows. Chemistry, including Physics in their relation to Chemistry, is dealt with in the session in two courses of lectures, delivered by Professor WYNDHAM DUNSTAN on Monday, Tuesday and Wednesday mornings at nine o'clock. These courses are not repetitions, but the first course, which extends from the beginning of October to the end of March, is designed to meet the requirements of elementary students, as it deals with the principal facts of chemistry and of the branches of physics most closely allied to it, while the second course, which commences in the third week in April and ends in the second week in July, is chiefly concerned with organic chemistry and is more particularly intended for advanced students. Practical Chemistry is provided for in the Laboratories under the supervision of Professor ATTFIELD and his assistants. A junior course occupies about six months, the senior course filling up the remainder of ten months, and either can be commenced at any time when the laboratories are open. The lectures on Botany, delivered by Professor GREEN on Friday and Saturday mornings, are also divided into courses, the first and longer one dealing with the Morphology and Anatomy of Plants, and the second, which is delivered in the Royal Botanic Gardens, Regent's Park, with the principles of Classification. In connection with these lectures classes for practical histological and other work are held under the direction of the Professor. On Thursday mornings Materia Medica is taught by Mr. E. M. HOLMES, the Curator of the Society's Museum, in lectures followed by demonstrations. Here also there are two courses, the first covering a description of the physical characteristics and active principles of all the more common animal and vegetable drugs, the means of distinguishing drugs of good quality, and of recognizing adulterations and substitutions, as well as their geographical, botanical and commercial sources, whilst the second course deals with other drugs less frequently met with in this country, and includes instruction in the use of the microscope in the recognition of simple drugs and of impurities in powders. Lastly, Pharmacy and Practical Pharmacy are in the competent hands of Mr. JOSEPH INCE, whose lectures and demonstrations are delivered on Tuesday, Thursday and Friday afternoons, commencing on the 4th of October, a complete course lasting five months.

Returning to the subject of the meeting on Wednesday evening next, mention must not be omitted that it will derive additional interest from the ceremony of the presentation of the fifth HANBURY Medal. This medal, it will be remembered, was instituted as a memorial to the late DANIEL HANBURY, and is awarded biennially for high excellence in research in the natural history and chemistry of drugs. Previous recipients have represented Germany, England, Russia and the Indian Service. On this occasion the medal will go to France, it having been awarded to Professor GUSTAV PLANCHON, M.D., D. es. Sc., Director of the Paris School of Pharmacy, who it is hoped will be present to receive it in person.

We are glad to be able to state, in reference to a subject mentioned in these columns last week, that the Council of the Midland Counties Chemists' Association has now decided that the classes for pharmaceutical students in connection with the association shall be resumed on Monday evening, October 14, the lectures to be delivered in the Educational Chambers, 90, New Street, Birmingham. A "Preliminary" class will meet on Monday and Wednesday evenings, at half-past eight o'clock, at which the subjects of English, Latin and Arithmetic will be taught by Mr. Stokes Dewson, and the same gentleman will lecture on Chemistry and Chemical Physics on Tuesday evenings. Materia Medica will be taught on Friday evenings, from eight to nine o'clock, by Mr. F. H. Alcock, after which Mr. G. E. Perry will conduct a Pharmacy class for an hour. Arrangements for an advanced class and a class for Practical Dispensing are under consideration, but the formation of these classes will be dependent upon the number of persons who intimate their wish to join them. Further particulars may be obtained from either of the Honorary Secretaries, Mr. C. Thompson, 159, Stratford Road, Sparkbrook, or Mr. F. H. Alcock, Temple Chambers, Broad Street Corner, Birmingham.

* * *

The opening meeting and Conversazione of the Midland Counties Chemists' Association is to be held at the Midland Hotel, New Street, Birmingham, on Tuesday, October 8, when an inaugural address will be delivered by the President, Mr. W. F. Wyley.

* * *

The inaugural meeting of the fifth session of the Sheffield School of Pharmacy will be held on Thursday evening, October 10, when an address will be delivered by Mr. S. R. Atkins, of Salisbury. On the same day, but previous to this meeting, the Annual Dinner of the Sheffield Pharmaceutical and Chemical Society will be held in the Masonic Hall, Surrey Street.

* * *

A remarkable case of poisoning, which occurred at Kilburn, has been reported in the daily papers this week. Four young men gathered a quantity of berries and one of them took them home, believing them to be edible, and had a pie made of them, with the result that himself, his wife and three children had to be taken to St. Mary's Hospital. The other three men, who also had apparently eaten some of the berries, were subsequently taken to the same hospital. The berries, which were shown to Mr. Allen, pharmaceutical chemist, of Kilburn, were at once recognized by him as those of belladonna. Fortunately belladonna is a somewhat rare and local plant, or cases of poisoning might be more frequent, the berries bearing a strong resemblance to small blackberries in size and colour. The plant from which the berries were gathered appears to have been growing by the Metropolitan Railway at Kilburn, the seeds having probably got there in chalk ballast, which is often used for draining railway cuttings in clayey soil.

* * *

We regret to have to report the death on Wednesday last, of Mrs. Louisa Kennett, who was elected an annuitant on the Benevolent Fund in the year 1880. This is the fourth death that has taken place among the annuitants since the last election.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.

FIRST DAY'S PROCEEDINGS.

Tuesday, September 10.

(*Continued from page* 231.)

The next paper read was a—

Note on Extract of Stramonium.

BY A. W. GERRARD, F.C.S.

A few months ago, requiring some extract of stramonium hurriedly for a prescription, and finding our stock exhausted, my attention was directed to the quickest way of preparing some so as to best meet the requirements of the case. As the official process is somewhat lengthy, occupying much time, it was thought that percolation of the stramonium seeds with ether to remove oil might be omitted, and exhaustion at once effected by means of proof spirit. Accordingly some well bruised stramonium seeds were exhausted with hot proof spirit; and from the tincture on evaporation a satisfactory extract was obtained containing very little fixed oil; the oil was easily removed by washing with a few drachms of ether.

Believing the above process might be made the basis of an improvement on that followed in the B.P., especially as regards shortening time and saving ether, the following experiments were instituted to determine the point.

In the first place it was essential that the yield of fixed oil and of extract by the official process should be determined, so as to compare them with the yield by proof spirit. For this purpose four samples of stramonium seed from various sources were exhausted consecutively with ether and proof spirit. The average percentage of fixed oil obtained was 23·1, of dry extract 4·47.

In the next experiment 1000 grains each of the above samples of seed were exhausted by maceration and percolation with proof spirit, the solutions on evaporating yielding extracts almost free from fixed oil, having merely a slight greasiness; in fact, less fixed oil had been dissolved by cold proof spirit than by hot, as would be expected. The extracts of the above operation, after washing with ether and drying, gave an average yield of 4·4 per cent. extract. So far the results were decidedly in favour of omitting ether percolation, and although ether had been used it did not amount to one-fortieth the volume required to remove the oil from the seeds. Moreover, it is my opinion that in a general way even washing the extract with ether might be dispensed with, for the extract does not contain anything like the amount of oil present in extract of nux vomica.

The next step was to prove that so far as strength and active principle were concerned, the new extract was identical with that of the B.P., a matter about which there could be very little doubt. For this purpose fifty grains of each extract was dissolved in a little water, a large excess of ammonia added, and the mixture well shaken with three successive quantities of chloroform. The chloroform on separation and evaporation gave from the official extract a residue of daturine weighing 2·2 grains, and from the extract by the new process 2·15 grains, practically no difference except what may be ascribed to experimental error. As it is thus evident that the active principle is present in the new extract in the same proportion as in the old, it may be fairly asserted there would be no difference in therapeutic action.

From the evidence resulting from the above experiments we may reasonably submit to the compilers of our Pharmacopœia the desirability of amending the official process for making extract of stramonium, suggesting that percolation of the seeds with ether be discontinued, that proof spirit alone be used as the solvent, and the resulting extract, if containing oil, washed with ether.

As a further remark bearing upon this subject, it may be stated that in a general way, where a drug contains a fixed oil, and it is desired to prepare from the drug an alcoholic extract, the most economical process is to exhaust the drug first with alcohol, finally removing any oil present in the alcoholic extract by washing with ether.

The President said for years he had given up percolation by ether, which he looked upon as merely a waste of ether, just as it was in the treatment of ergot, as was formerly directed. He hoped that in the next edition of the Pharmacopœia the direction for the use of ether in the case of stramonium, which only had the effect of extracting the valueless fixed oil, would be omitted.

Mr. Conroy said he had adopted the same practice as had been mentioned by the President for some years, and he could fully confirm Mr. Gerrard's statement that the product was fully equal to that obtained when ether was used.

The next paper read was on—

Ferri et Ammonii Citras.

BY B. S. PROCTOR, F.I.C.

In the early part of 1887 I had repeated complaints that mixtures containing this salt speedily went wrong. Two of the mixtures specially noted were as follows:—

℞ Ferri Ammon. cit.	ʒi.
Ammon. brom.	ʒss.
Syr. aurantii	ʒvi.
Aq.	ad ℥vi.
M.	

(A. 970).

℞ Ferri ammon. cit.	gr. xl.
Aq.	℥viii.
M.	

(A. 985).

The latter mixture most quickly changed, gradually becoming turbid, depositing a brown precipitate, and the liquor at last becoming colourless, or nearly so.

For comparison, a bottle of the same was made with hard water instead of distilled. Decomposition took place, but this time the precipitate was of two natures, one part being buff, another part black.

The precipitate treated with HCl gave off carbonic acid and H_2S. This experience was new to me, probably because the salt in question is most frequently prescribed with other matters which add to its stability or mask its change.

I obtained samples from some of my neighbours, but found there was no notable difference in their behaviour, my own sample going bad rather more quickly than that from one of my neighbours, and more slowly than the sample from another firm. Two of these, when burnt off, left of ferric oxide 32 per cent. and 30·7 per cent. respectively, the latter being the sample which had spoiled most rapidly. Mr. Umney, in the *Pharmaceutical Journal* of December, 1873, has expressed the opinion that the proportion of citrate of ammonium is the point upon which stability chiefly depends, and that the present official salt, which contains a less proportion than those of two previous Pharmacopœias, is less stable in consequence, hence the trouble springing up now which did not arise in former years. But the fact just noted that the sample containing 30·7 per cent. of ferric oxide decomposed more rapidly than those which contained 32 per cent., would imply that at any rate this is not the only circumstance upon which stability depends. But while I say this, I must also

add that I acted upon the suggestion of Mr. Umney's paper, adding citrate of ammonium to the sample which had troubled me, and by so doing improved its keeping quality, the addition being made in such proportion as reduced the ferric oxide to 30 per cent., which the Pharmacopœia says is about what it ought to contain. But with this addition the stability was still inferior to that of two other commercial samples which I had meanwhile obtained.

A solution of the citrate rendered alkaline by a small addition of ammonia kept quite clear and unchanged for several months, and another solution rendered acid with citric acid kept quite clear for a similar time, but gradually became paler, and was found to have part of the iron in the ferrous state.

At a subsequent date, when estimating the iron in another sample of the same salt by burning 50 gr. in a platinum capsule, my object being to ascertain under what circumstances the residue of the combustion could be depended upon as being ferric oxide sufficiently pure to be accepted as evidence of the proportion of ferric oxide present in the sample, it was anticipated that the first effect of the heat would be to reduce the iron, or part of it, to either the ferrous or magnetic oxide, and with the view of determining this the contents of the capsule, when imperfectly burned, were tested with a magnet and treated with hydrochloric acid. They were found to contain magnetic oxide, and to evolve an odour of H_2S by the action of the acid. Clear evidence not only that reduction of the ferric oxide had taken place, but that the sample under treatment contained a sulphate. The presence of this impurity was confirmed by the barium test applied to the original salt, and more satisfactorily by the same test applied to the residue of a combustion effected with nitrate of potassium.

The next question is, how did the sulphate get there? I have no wish to bind manufacturers to follow the processes of the B.P., provided they obtain equally good results by the processes they adopt; but the results must be equally good, or the deviation becomes objectionable, and it is worth while glancing at the probable deviations from the official formula which would be liable to introduce this impurity.

Consulting a well-known maker of this salt, I learned that he expected a trace of sulphate, but only a trace, to be present in his product, and he attributed its presence to precipitating the ferric hydrate with caustic soda and the use of hard water, instead of using ammonia and distilled water, as the Pharmacopœia directs. And he was astonished to hear that I had found 2 per cent of SO_3, his idea being that $\frac{2}{10}$ths per cent. was too much, and $\frac{2}{100}$ths per cent. more like the probable figure.

However, upon examining a sample which I could depend upon having been made by precipitation with ammonia, I found sulphates present in very palpable quantity, and as lime was present only in very small traces the hard water doctrine did not appear a probable explanation.

Indeed, the considerable solubility of calcium sulphate in water and its still greater solubility in many saline solutions seemed sufficient ground for discrediting that theory.

The fact well known to analysts that ferric hydrate precipitated from the sulphate usually contains a notable admixture of basic sulphate, unless the caustic alkali used in the precipitation be constantly kept in free excess, suffices to explain the presence of the sulphate found in the finished product. For the basic sulphate, when once formed, is not readily deprived of its acid unless by considerable excess of caustic alkali, and either long maceration or boiling, and this I anticipate is just as much the case when ammonia is used as with the use of caustic soda. The advantage of using ammonia being that the excess is more readily washed out, and if a little remains it does not introduce into the finished product a base not legitimately there. Seeking for the means of avoiding this basic sulphate, I should look for it in a little change in the mode of manipulation. Taking a lesson from the experience of the late Mr. Hugh Lee-Pattinson in the manufacture of oxychloride of lead, when it was important to precipitate all the lead from the solution of chloride, and equally important to avoid an excess of the lime water used as a precipitant, as it spoiled the colour of the pigment, the two solutions were run into one another in thin streams so regulated that the correct equivalent proportions were pretty closely maintained.

Though the official formula for citrate of iron and ammonium may work perfectly when you pour 10 ounces of solution of ferric sulphate into 23 ounces of solution of ammonia, it is very likely to fail when hundredweights are substituted for ounces. Minutes instead of seconds will elapse before perfect mixture is effected, and while the stream of iron liquor is flowing into the alkali the centre of the stream will always contain iron in excess over alkali for a period which, though short, may be long enough to result in the formation of some basic ferric sulphate which may escape decomposition after the mixing is complete. The result is a brown precipitate suspended in a solution distinctly alkaline, and though to all appearances correct, it may contain basic sulphate along with ferric hydrate, and thus account for the faulty product being obtained, while there has been no deviation from the official process but that which every manufacturer is bound to adopt, namely, to work upon larger quantities.

The time involved in chemical action is a point difficult to define, difficult to investigate, but not to be overlooked.

In connection with this subject it is worthy of note that the sulphate present in the citrate was not readily detected or estimated by direct addition of barium chloride to a solution of the scales in water. It is unnecessary to describe all the experiments in detail, but the results I obtained, briefly stated, are as follows.

Five samples examined for the percentage of ferric oxide gave:—

P	32·0
B	30·7
A	30·0
D	32·5
H	28·0

With regard to the sulphate present as an impurity the first observation was the finding of sulphide in one of the mixtures dispensed, after it had been kept for some time; to this I may now add the results of several other experiments.

A. A sample of the citrate ignited in a platinum capsule left a residue containing magnetic oxide of iron.

B. A similar result was obtained, and the residue being treated with hydrochloric acid yielded hydrogen sulphide.

C. A sample of the citrate dissolved in water gave no immediate precipitate with barium chloride.

D. A sample of the citrate ignited with potassium nitrate and barium chloride yielded barium sulphate equal to 2 per cent. of sulphuric anhydride.

E. The same repeated with the same results.

F. Twenty grains of the citrate, not burned, dissolved in water and hydrochloric acid, and barium chloride added, on standing two days deposited barium sulphate equal to 1·2 per cent. of sulphuric anhydride.

G. Twenty grains not burned nor acidulated, on the addition of barium chloride gradually deposited a precipitate which on standing two days amounted to barium sulphate equal to 1 per cent. of sulphuric anhydride.

I. Fifty grains of the citrate dissolved in an ounce

of water, four grains of barium chloride added and set aside for 20 hours and then filtered; the precipitate contained 0·7 of barium sulphate. The mother liquor with a free addition of hydrochloric acid yielded 2·0 of barium sulphate. This shows that the barium salt very slowly precipitates the sulphuric radicle in the presence of neutral or alkaline citrate of iron and ammonium, but that the precipitation is effected on adding hydrochloric acid enough to convert the citrates into chlorides and free citric acid. The total barium sulphate obtained in this case corresponds with the yield from the preceding combustion experiments and others I had tried, except that there was a loss involved in filtering out the first precipitate, the second precipitate being obtained from the filtrate without the washings.

M. Fifty grains of the same sample dissolved in an ounce of water, two fluid drachms of hydrochloric acid added and four grains of barium chloride yielded a precipitate not instantaneously, but speedily, which, on standing 20 hours amounted to 2·9 or 5·8 per cent., against 5·4 per cent. in the last preceding experiment.

As I have not met with any statement of this effect of citrates in retarding the precipitation of barium sulphate, I think it worth while to emphasize the observation by recording a confirmatory experiment.

To about 100 grains of solution of ammonium citrate, a drop of dilute sulphuric acid was added, and then a drop of solution of barium chloride. The solution remained clear for some time, a very faint opalescence developing in course of an hour, and a milky appearance in the course of a day, but by appearances only about one-tenth of what is produced with the same quantity of sulphuric acid and barium chloride in the absence of the citrate.

Tartrate of ammonium has a similar retarding effect to a rather smaller degree.

The PRESIDENT was glad to learn that the ammonio-citrate of iron in use in the trade now was found to be more uniform than it was some fifteen years ago, when he examined one official salt and found it contained 26 per cent. of ferric oxide, whilst some manufacturers put in as much as 32 per cent. The presence of basic sulphate of iron in the salt was certainly objectionable. This matter was by no means new, having been dealt with by Dr. Redwood many years ago, when he emphasized particularly that students should learn how to precipitate ferric hydrate with an alkaline solution. Mr. Proctor had shown how even manufacturers operating on a large quantity might deceive themselves as to the alkali being always in excess. Operating on a large scale he always tried to keep it in excess, but there were chances that some of the solution of the persulphate of iron would sometimes be rather in excess of the alkali. If makers took greater care in the precipitation of the ferric hydrate, they would not have complaints of an objectionable quantity of 2 per cent. of basic sulphate in the ammonio-citrate of iron.

Mr. MABEN would have expected a solution containing 40 grains of ferri ammon. cit. in 8 ounces of water would go wrong in any case, for stock solutions of that drug would not keep, and he should therefore expect a weak solution would certainly go wrong, owing to the presence of an organic acid in ferri ammonii citras.

Mr. PROCTOR said he had tried three samples, his own make and that of two neighbours, and they all went wrong rapidly. He got some from another maker and it did not go wrong with the same mixture. He did not understand the difference, and should be glad to know if anyone else did, but he could not get this last mixture to go bad.

Mr. MARTINDALE thought that probably the solution before scaling had been allowed too long an exposure, and that organic germs or growths had been formed in the solution before it was scaled. Scaling liquors were very apt, unless they were scaled off rapidly, to decompose, because of their containing organic salts. Even distilled water, when old, was very apt to have germs of growth in it.

The PRESIDENT said it was just possible that bromide of ammonium might not always be quite neutral but might sometimes contain an excess of alkali. In the Pharmacopœia preparation of ammonio-citrate of iron there was a saturated solution of ferric hydrate in the cold in strong citric acid. When he suggested that form he had in view the objection which always applied to heating a preparation that had to be subsequently scaled. In proportion as such preparations were boiled they were generally spoiled, as was known to every one who had any experience in the making of them. Manufacturers generally got the first preparation in the most concentrated form possible, the ferric hydrate in solid lumps, so obtained by draining and pressure. That was then dissolved in a very saturated solution of citric acid, so that there was very little to be done with it other than adding the alkali. When solutions were of that strength there was not much chance of vegetable growths forming in them, though he agreed with Mr. Martindale that in weak solutions they were very apt to occur; and, in fact, nothing favoured their growth more than a weak citric acid solution. He was inclined to think the very weak affinity between citric acid and iron, especially a saturated solution in the cold, partly explained the change that occurred. They all knew that ammonio-citrate of iron underwent a change in the process of time, and possibly some slight alkalinity might produce the turbidity or opalescent appearance.

Mr. PROCTOR said it was not the turbidity he had to complain of, but the total loss of colour and the throwing down of the iron.

Mr. DOTT said there would be no error in the estimation of the amount of iron, supposing the iron were in the form of ferrous oxide, because if it were sufficiently ignited it would be converted into the ferric form. With regard to the determination of the presence of sulphuric acid as barium salt, he had frequently noticed that many substances retarded the precipitation of sulphate of barium, even in the presence of a considerable excess of hydrochloric acid, so that testing hurriedly one might think there was no sulphate present, when there was really an appreciable quantity.

Mr. PROCTOR, in reply, said when he found distilled water gave the results he had described, he tried ordinary tap-water, and that went bad just in the same way. Mr. Umney suggested that an alkaline condition of the bromide of ammonium might affect the product, but as he had said he had tried another specimen, making one portion alkaline and another acid, and neither of them went wrong. He was more inclined to attach weight to what Mr. Martindale said about the possibility of explaining the decomposition as taking place in the preparation of the article before it was scaled from the circumstance that the batch which was in his hands and in those of his neighbours all went wrong at the same time, but none of them had gone wrong since. It might have been a manufacturer's batch which got into the hands of himself and his friends at that time. He did not know whether others had met with the same difficulty, but if they had not, it might arise from the character of the mixtures they had to dispense being less liable to change, there being spirit in their composition which would tend to prevent decomposition. With regard to Mr. Dott's remark, he would say that if the reduction took place in the first part of the operation, a very considerable time and a good red heat would be required to get the whole of the iron into the ferric state; it maintained its magnetic property and a certain small trace of the lower

oxide for a considerable time. If it could be said that the oxide remained magnetic after it had had the whole dose of oxygen, which was possible, it was a point he had to learn; so far he was not aware of it.

The next paper read was on—

Easton's Syrup.

BY T. MALTBY CLAGUE,
Pharmaceutical Chemist.

This useful and popular compound has been prolific in the production of difficulties for the pharmacist and dispenser, and correspondingly fertile in the matter of literature upon itself and its faults.

Originally devised by Dr. Easton and published in Aitken's 'Science and Practice of Medicine,' vol. 2, it stood thus:—

℞ Ferri sulphat.	℥v.
*Sodii phosphat.	℥vj.
Quin. sulphat.	gr. 192
Acid. sulph. dil.	q. s.
Aq. ammoniæ.	q. s.
Strychnin.	gr. vj.
Acid. phosphoric. dil.	℥xiv.
Sacch. alb.	℥xiv.

The instructions are to dissolve ferrous sulphate in water and precipitate with sodium phosphate, wash, drain and press; dissolve quinine sulphate in water by aid of ac. sulph. dil. and precipitate with aq. ammon., wash and press. These precipitates and the strychnine are to be dissolved in the ac. phosph. dil., and in this solution the sugar is to be dissolved without heat. Although not given, it is evident from the context that the bulk is to measure twenty-four ounces.

For a ready consumption this formula leaves nothing to be desired; but on keeping the preparation a brown colour is developed, causing undesirable differences in its appearances at various times.

In the 'Year Book' for 1871 is a paper by Mr. Michael Carteighe, which included a ready method for its preparation from a solution which preserves its colour better. But why the author doubled the quantity of ferrous phosphate present is not apparent.

In the 'Extra Pharmacopœia,' Mr. Martindale gives a convenient mode of preparing this syrup from iron wire, and this, when in the form of syrup, does not precipitate so much or darken in colour so rapidly as when it is prepared from the precipitated ferrous phosphate.

My reason for again directing attention to this subject is that during the past two winters I have met with samples of this syrup in a condition most unsightly in appearance and discreditable to pharmacy; these have been sent out by different makers, but all have been exposed to cold. The first and the second of these that came under my notice I could not work with because of my ignorance of the mode in which they had been prepared; but later on I obtained possession of some the history of which was known. Instead of a syrup it was a jelly-like mass with long needle-shaped crystals and tufts of crystals, and a smaller amount of a fine precipitate showing. Warmth brought about solution, but on cooling to about 32° F. precipitation again began. The addition of 25 per cent. of water sufficed to maintain solution when again exposed to cold. The addition of the requisite quantity of quinine, strychnine and ferrous phosphate to make this up to Easton's strength was next tried, solution was permanent. The fact just mentioned and the high specific gravity of all the samples led me to suspect the quantity of the sugar as the cause of the trouble.

Samples were next prepared by, 1st, Easton's original formula, 2nd, Martindale's, and 3rd, one containing more sugar than either, and it was found that the precipitation and gelatinous appearance was in proportion to the quantity of sugar present.

* A little, say ℥j. more gives better result.

	Easton.	Martindale.	Offending Sample.
Quin. phosph.	1·0	1·0	1·0
$Fe_3(PO_4)_2$	1·0	1·0	1·0
Total P_2O_5	4·04	4·0	4·1
Sugar	35·0	37·5	42·0
Water	28·4	26·4	23·0

The above table gives in grains the quantities present in each fluid drachm.

Another experiment to confirm this view. Using Martindale's solution of ferrous phosphate and of alkaloids, but with sugar in the proportions of 4-5-6 and 7 drachms to the fluid ounce, and submitting these repeatedly to freezing mixture, precipitation showed in direct proportion to quantity of sugar present. Or rather the first named gave none, the second a trace, while the third was marked, and the fourth considerable.

The gelatinous syrup was dealt with in the following manner. Thrown upon a muslin strainer the syrup passed through and left upon the strainer a mass of soft crystals matted together. Drained, pressed, and dried at 90° F. it weighed 8·4 grains; dried at 212° F. it weighed 7·5 grains. Submitted to quantitative analysis it showed:—

Insoluble in water	6·66
Quinine phosphate	44·53
Ac. phosphoric. (pur.)	13·33
Sugar	35·48
	100·0.

The portion insoluble in water responded to tests for iron and phosphoric acid, and was probably the same as the precipitate reported upon by Mr. T. B. Groves.

I am not prepared to put forward a reason for the production of this precipitation of the quinine phosphate and gelatinization of the syrup; but the mental suggestion is that gelatinization is similar to that in the case of solutions of quinine sulphate in hydrobromic acid when potassium tartrate is present in minute quantities and to that observed in mixtures containing tinct. ferri perchlor., quin. sulph. and sp. chloroformi. And also in this connection we may remember the fact that atropine in minute quantities causes the gelatinization of paraffinum liquidum.

My suggestion for the preparation of Easton's syrup therefore is, that where it finds a ready use the original formula be adhered to. That where it is not in so frequent demand the formula of the 'Extra Pharmacopœia' be used, but that the quantity of sugar be reduced at least 10 per cent in order that it may brave a northern winter with impunity.

In closing this paper, I would respectfully express my regret that in the B.P.C. unofficial formulæ there should be introduced a preparation bearing the same name which Easton gave to his syrup, and only containing three-fourths as much quinine phosphate. This is liable to cause some to make the mistake of supposing them to be identical, and may cause the "not over particular" to substitute the one for the other.

The President said this paper was a very practical one. All who were accustomed to handle Easton's and other phosphatic syrups knew the solidification which took place with syrup under certain conditions. His own experience was that this solidification of syrup had been noticeable the last few years more than formerly, and he believed it arose from the almost entire absence of cane sugar from commerce. Of course cane sugar could be obtained, but at least 95 per cent. of the sugar of trade was beet sugar. In practice syrup of iodide of iron and other syrups

under some conditions which he did not quite understand, would be found one morning perfectly fluid and quite right, and the next morning a perfectly solid mass, and probably other gentlemen could support his experience. No doubt this was due to the presence of a small quantity of inverted sugar or something present in the beet sugar which was not present in cane sugar. The presence of phosphates also aided deposition, and that made the concentration in liquors objectionable. Sometimes the whole contents of a bottle would be found solidified, looking like a crystalline mass of phosphate of quinine, but no doubt the principal cause of the evil complained of was the use of beet sugar instead of pure sucrose from cane.

Mr. LINFORD having had a good deal of experience in the manufacture of Easton's syrup agreed perfectly with what Mr. Clague had said as to the excess of sugar. When he first made it it was constantly going thick in cold weather, forming a mass of soft crystals. Then he adopted the plan of using less sugar, when it left off crystallizing, but readily changed colour. It was necessary, therefore, to find some method of making it by which it would keep its colour, and he adopted Mr. Martindale's method of making the phosphate of iron about eight times the strength, so that one-eighth the quantity was necessary to make Easton's syrup. He kept that in a small 6 oz. bottle with no cork in, but adopted the Italian method of filling the bottle right into the neck, and then put about half a drachm of oil on the top. That was easily thrown off when wanted for use, and he had found it would keep certainly six months in that way without any change of colour whatever. In making Easton's syrup he always dissolved the quinine and strychnine in phosphoric acid, glycerine, and water, but he could not give the exact proportion. That was also made of such a strength that one part of the solution and three of syrup of phosphate of iron made Easton's syrup. It was always freshly made when it went out, and was always sent out perfectly bright. The action of the glycerine was that syrup so made would keep at least three times as long without changing colour.

Mr. CONROY said this paper was a most important one, and he could entirely agree with Mr. Clague's remarks with reference to the reduction in the quantity of sugar having the desired effect. He had worked with sugar which was guaranteed to be real cane sugar, and had no reason to doubt it, but in using the full amount of cane sugar he still found the syrup solidified. This solidification might be overcome by reducing the amount of sugar, but the greater difficulty was the discoloration, especially when the syrup had to be exported to a hot climate. He could also confirm the statement that the concentrated liquor used for making syrup, when made with the full amount of quinine, also became discoloured. That was more important than the point mentioned by Mr. Clague. His experience was that when the full amount of quinine was put in, whether to liquor or syrup, the syrup always became discoloured. With reference to the last speaker's remarks, he would say that the quantity of quinine in Mr. Martindale's formula was only three-fourths the amount in the original, but it was really phosphate of quinine. In the original formula the precipitation and subsequent washing would reduce the amount specified to about that ordered in Mr. Martindale's formula.

Mr. MARTINDALE said this was a formula with which he had had a great deal of experience; the formula which he published first and modified afterwards as published in the B.P.C. Formulary, he had been perfectly satisfied with. It was impossible to prevent discoloration. The preparation was not intended to be kept any length of time, but by the process published in the Formulary it could be made in ten minutes at any time, and that being so, what was the object in keeping it? The syrup of phosphate of iron could be kept very well, and the addition of phosphate of quinine and strychnine could be made at any time. He differed from the B.P. process in making the syrup of phosphate of iron, as the present formula was so exceedingly acid that it was unpalatable to take, especially for children. Even the formula of the 1867 edition was excessively acid, but it was a good reasonable formula. If made by the direct solution of pure iron wire in phosphoric acid the preparation underwent little oxidation or conversion into perphosphate; it would keep very well, and upon adding the amount of phosphate of quinine and strychnine to that with a slight excess of phosphoric acid he had never got that deposit, which many writers complained of, of a little whitish precipitate at the bottom of the bottle. If the full quantity of phosphate of quinine it was supposed to contain were put in, one grain in the fluid drachm, it would crystallize, probably because quinine was purer now than it used to be when the formula was originally devised. He rarely found it crystallize out unless the syrup were exposed to much cold. Once during last winter one sample which was more exposed to cold than others did become changed into a block of crystals, but it was hardly the formula Mr. Clague had given, as he put in only $\frac{3}{4}$ths of a grain of phosphate of quinine in place of one grain to the drachm. The formula said it should contain an equal quantity of phosphate of quinine and phosphate of iron, but it was not possible to keep such a preparation; if it was pure phosphate of quinine that was used it would crystallize if the temperature were reduced below 40° F. Any other deposit than that crystallization he had not seen for years, and he imagined this was because he used a syrup made by the direct combination of phosphoric acid and iron, not by the precipitation process. He only made about 2 lbs. at a time, and seeing that it could be made in ten minutes there was no reason why it it should be kept a long time. It was much better to keep drugs in a condition in which they could be kept properly than to make a compound which was liable to change. If the syrup did turn brown the best way was to throw it away and make fresh.

Mr. WRENN could hardly agree with the last remark, that when a preparation went brown it should be thrown away. It was a better plan to guard against it turning brown. When washing the precipitate of iron he kept adding water, so that it did not acquire a blue colour. If care were taken in making up the bulk it could be made perfectly accurate, and then there would not be any precipitate. By all means he should advise chemists only to use Martineau's sugar.

Mr. NAYLOR said there was another point of view from which this question had not been sufficiently studied, which at first sight did not appear a promising one, but at any rate it would be an instructive one, and that was the amount of phosphoric acid that was used. He had not observed a precipitation so much of the syrup, but he had been many times puzzled by the appearance of this deposit in the corresponding concentrated liquors. So far as he had been able to ascertain from a limited number of experiments, from examining the quinine used and determining the amount of iron and quinine present in the liquor itself, and knowing the kind of sugar which had been used, he had been led to the conclusion that the deposit might not have occurred through a deficiency but through an excess of phosphoric acid. He remembered having separated this quinine body some time ago, and submitted it to a gentleman thoroughly conversant with the examination of quinine preparations, who distinctly pronounced it to be an acid phosphate of quinine. Being a maker of quinine he also informed him that there were different kinds of phosphate of quinine, and that it was very important

that the amount of phosphoric acid should be kept within due limits. He was rather inclined to think that this question might be studied with profit from that point of view as well as from the sugar side of the question.

Mr. DOTT said there was no question that the amount of sugar used in this preparation had a great effect on the precipitation of quinine or any alkaloidal salt, but as Mr. Naylor had remarked, the degree of acidity was a more important question. He believed preparations were often made under the belief that alkaloidal salts were more soluble in an excess of acid, but according to the law of solubilities it was rather the other way. An excess of acid tended to precipitate the alkaloidal salt from solution; the molecules of the acid had an attraction for the molecules of the water, and instead of getting a better solution by excess of acid the salt precipitated.

Mr. CLAGUE said he had in some other experiments fully satisfied himself that glycerine did retard the colouring effect in a syrup of this kind, and he should be glad if on official authority they were allowed to use it. The liquor certainly did discolour, but that made from iron wire discoloured to nothing like the same extent as that made from precipitated phosphate. He liked the method as introduced by Mr. Martindale very much better. That gentleman, however, had not met with the difficulty to which he referred, but that probably arose simply from the fact that Mr. Martindale was living in not quite the same latitude. They were there not so far north as some friends whom he saw nodding assent to his difficulties when he was reading the paper, who lived on the hills in the neighbourhood. These samples were nearly all kept in surgeries in lean-tos to houses on perhaps a bare hill-side, and that fully explained why what might be a very good syrup in Mr. Martindale's establishment, which was probably warmed every day, might not be altogether satisfactory for use under the circumstances he had named. As to the precipitation at 40° F., if the full quantity of quinine phosphate was present, he must join issue with Mr. Martindale on that point. He found that he could put in the full quantity, and could cool it if he used less sugar not only to 40°, but to 50° below zero.

Mr. MARTINDALE remarked that if there were a strong sugar solution it interfered with the solubility.

Mr. CLAGUE said that was the point at the close of the paper. There could be no doubt that if the quantity of sugar was lessened by 10 or 15 per cent. the syrup could be cooled down to almost any attainable degree of cold without solidifying.

The PRESIDENT said there was no reason why syrup so dense should be used.

Mr. CLAGUE added that the President's remark might be applied to a great many other syrups of the same class. Why so much sugar should be used he did not know; it made them more troublesome to keep and to take in every possible way.

The next paper read was a—

NOTE ON THE EFFECT OF THE USE OF NITROUS VITRIOL IN MAKING CERTAIN AERATED WATERS.

BY JOHN PATTINSON, F.I.C., F.C.S.

A manufacturer of aerated waters in the neighbourhood of Newcastle-upon-Tyne recently found that the ginger ale he was making assumed a milky opalescence or turbidity a day or two after it had been aerated and bottled. The same materials, with the exception of the vitriol used for generating carbonic acid, had been used for some time without showing this objectionable turbidity in the ginger ale, and this naturally threw suspicion on the vitriol as being the cause of the change. On examination I found this vitriol contained nitrous compounds equivalent to 0·027 per cent. of nitrous anhydride (N_2O_3) by weight. In order to ascertain if the presence of these nitrous compounds was the cause of the turbidity, a stream of carbonic acid, generated from marble and pure oil of vitriol, absolutely free from nitrous compounds, was passed through a solution containing the same proportions of ginger essence, syrup, etc., as were used in the manufacture. The solution remained perfectly clear for several days. Then through another portion of the same solution a stream of carbonic acid made by acting on marble with the suspected vitriol containing nitrous compounds was passed. In this case the solution assumed the objectionable milky opalescent appearance in about twenty-four hours. Through a third portion of the solution I passed a stream of carbonic acid made from pure vitriol to which I added nitrite of potassium equal to 0·06 per cent. of nitrous anhydride. In this case also the milky opalescence appeared in about twenty-four hours. It was thus shown that the objectionable turbidity was caused by the nitrous compounds in the vitriol which had been carried over with the carbonic acid.

Further experiments showed that the objectionable action was upon the ginger essence and not upon the syrup and other ingredients used. It was also found that the nitrous compounds discharged nearly the whole of the colour from the ginger essence.

I have not had an opportunity of ascertaining if the same effect is produced on the other essences used in the making of aerated waters, but it is possible that this may be the case.

Fortunately there is no difficulty in obtaining vitriol absolutely free from nitrous compounds, so that this objectionable result in the manufacture of aerated waters may be easily avoided.

The PRESIDENT said the members of the Conference were much indebted to Mr. Pattinson, the public analyst of Newcastle, for coming to contribute something to their knowledge of the defects in the manufacture of aerated waters, the more so as Mr. Pattinson's experiments quite agreed with those which had been previously made by Mr. Naylor, who some three or four years since worked in the same direction, although he was not so fortunate as Mr. Pattinson in having his attention directed to the oil of vitriol. He had to work over the essences and all manner of things before he could find the cause of the turbidity of the aerated waters he examined. That paper was published in the 'Year-Book' for 1885,* and the experiments now made quite corroborated the results there narrated. One point alluded to was the presence of nitrous compounds in the oil of vitriol of trade. He had been much impressed the day previously in visiting the chemical works of Messrs. Alhausen to see that they were putting up plant for the utilization of sulphur from alkali waste. He had no doubt whatever that even at the present time oil of vitriol could be procured much purer than the ordinary sulphuric acid. The acid produced by this process, which had been worked out by Messrs. Chance, of Birmingham, was a very beautiful, elegant acid, perfectly white. He did not know that it was actually free from nitrous compounds, but it was much purer than the ordinary brimstone acid met with in the trade, and he hoped manufacturers would have the opportunity, when this acid was procurable in quantity, which no doubt it would be soon, of using it for their aerated beverages.

Mr. NAYLOR did not know that he could add anything to what the President had said, except to remark that while his experiments travelled over the same ground as those of Mr. Pattinson, so far as his memory served him, it was not with the same object, his endeavour being not so much to point out the cause of the opalescence as to account for a defect in the pun-

* For original paper see *Pharmaceutical Journal*, [3], xv., 731.

gency. He had not observed that Mr. Pattinson had referred to that in his paper, and he would ask him whether the effect of the nitrous acid in the oil of vitriol was to at all destroy the pungency in the ginger ale.

Mr. T. HOWELL-WILLIAMS (London), as a manufacturer of mineral waters, had found a difficulty many years ago in accounting not so much for the opalescence as for the loss of flavour in ginger ale referred to by Mr. Naylor. Although this effect was most marked in ginger ale it occurred at the same time to some extent in almost every other beverage they prepared. After a long examination of almost everything likely to lead to this result, he found it was due to the nitrous or nitric acid fumes in the carbonic acid gas. The opalescence did not trouble them; they noticed a little dullness, but no opalescence, and having satisfied themselves of the cause they got over the difficulty. For some time they tested the oil of vitriol very carefully, but they did not find it now necessary to do so, because they simply passed the gas through a scrubber containing an alkaline solution of permanganate of potash. The small trace of nitrates and nitrites might be disregarded if this precaution were adopted.

Mr. PATTINSON said he observed on referring to the paper read by Mr. Naylor, that his experiments were undertaken for the purpose of throwing light on the utter loss of aroma and pungency in ginger ale, whilst his attention had not been directed at all to that point, but simply to the cause of the turbidity in the samples shown him. It was very likely, however, that the pungency also would be affected. With regard to the President's remarks about oil of vitriol he would say that that made from pure sulphur might contain nitrous compounds, and was just as likely to do so as ordinary oil of vitriol made from iron pyrites, but it would be free from arsenic. Manufacturers could easily destroy the nitrous contamination by heating the sulphuric acid with a little sulphate of ammonia. The presence of nitrous compounds could easily be ascertained. A drop or two of permanganate of potash put into 20 c.c. of oil of vitriol mixed with water would retain a pink colour if free from nitrous compounds, but if it contained them that drop and many others besides would be completely decoloured.

The following three papers were then read together:—

IPECACUANHA, FLUID EXTRACT AND WINE (STANDARDIZED).

BY J. OLDHAM BRAITHWAITE AND JOHN C. UMNEY.

A perusal of the literature relating to ipecacuanha and its preparations, which has been published in this country since the appearance of the present Pharmacopœia, shows that attention has been directed mainly to the estimation of the alkaloid.* There appears to exist also an almost unanimous opinion that the long continued heating of the extract involved in the process of the official wine is injurious to the alkaloid it contains, and hence several modifications of the method have been suggested, which obviate more or less this supposed defect.†

By reference to the papers quoted above, it will be seen that the only suggestion of a standardized preparation is that of Messrs. Thompson and Duncan, who propose that the "dried acetic extract of ipecacuanha should be so standardized as to yield not less than 6 per cent. of alkaloid." The method which these authors adopt for standardizing, by the direct titration with Mayer's reagent of an acid solution of the crude extract, is obviously unsatisfactory.

It is with a view of diverting attention to this phase of the question that we have undertaken the following experiments.

Our object has been to prepare a fluid extract of definite alkaloidal strength, removing as far as possible the natural soluble constituents of the root, from which a wine may be prepared equal to the official one in elegance and stability, and which shall at the same time contain a definite amount of emetine.

Throughout the course of these experiments we have used Ransom's "ammoniated chloroform" process (or a modification of it) for the assay of the emetine. This has proved to be the most expeditious for our purpose, and has given us results that are strictly comparative with each other.

The ipecacuanha root which we have employed was assayed after crushing a whole seron, and found to contain 1·32 per cent. of emetine. It was thought better to make use of a sample of low emetine value, as affording the most satisfactory basis of operations.

In the selection of a menstruum and method of procedure many experiments have been made which need not be enumerated in detail. In each case the amount of alkaloid left in the marc has been determined as well as that carried into solution, and it has been found, in some instances, that where almost complete exhaustion was effected an unsatisfactory extract resulted. It may be mentioned that, among others, acetic ether, with and without the admixture of lime to the root, and alcohol of various strengths with and without lime, and also aromatic spirit of ammonia, were employed, but finally rectified spirit was found to give the most satisfactory results.

In estimating the amount of emetine in these fluid extracts, it was found that Ransom's method was not directly applicable, owing to the chloroform producing an inseparable jelly with the solutions of these extracts. Acetic ether was similarly tried, but gave results much in excess of the amount of emetine originally found in the root. The following modification of Ransom's process, which has given excellent, and in every case, concordant results, was finally adopted.

Twenty cubic centimetres of a fluid extract is mixed with 40 c.c. of water, and the volatile solvent driven off by cautious evaporation on the water-bath. The resulting solution is filtered, washed and precipitated with basic acetate of lead. The lead precipitate is removed by filtration, well washed, and excess of the precipitant removed by sulphuretted hydrogen and the sulphide filtered out. The filtrate is then rendered very faintly alkaline with ammonia, and shaken with chloroform, which readily separates; the alkaloid is washed out of the solvent in the usual way with acidulated water and titrated by means of Mayer's solution.

The following was the final experiment which led to the adoption of rectified spirit as the most suitable menstruum:—

One hundred parts of the root in No. 20 powder were moistened with rectified spirit and packed in a percolator. More spirit was added and percolation continued until 80 fluid parts were obtained. This was reserved, and percolation proceeded with until the root was exhausted. The drained marc was then mixed with 10 parts of recently-slaked lime and again percolated to exhaustion. The spirit was recovered from the last two percolates, the resulting extracts dissolved in the reserved portion, and the whole made up to measure 100 fluid parts with rectified spirit.

Twenty cubic centimetres of this extract (equivalent

* Ransom, 'Year-Book,' 1887, page 450; Cripps and Whitby, *Pharm. Journ.*, 3rd series, vol. xix., page 721.

† P. Wells; *Pharm. Journ.*, [3], vol. xvi., p. 1024; T. Maben; *Pharm. Journ.*, [3], vol. xvi., p. 652; J. T. Grant; *Pharm. Journ.*, [3], vol. xviii., p. 592; C. A. McPherson; *Pharm. Journ.*, [3], vol. xviii., p. 830; J. W. Thompson and W. Duncan; *Pharm. Journ.*, [3], vol. xviii., p. 834; J. W. Thompson and W. Duncan; *Chemist and Druggist*, Jan. 12, 1886.

to 20 grams of root), estimated by the modified chloroform process previously mentioned, were found to contain 0·257 gram of emetine, equivalent to 1·285 grams from 100 grams of root. Twenty-two grams of the dry marc = 20 grams of root, exhausted by ammoniated chloroform, contained only 0·009 of emetine, equivalent to 0·045 per cent.

The sum of these two figures, viz., extract 1·285 per cent. and the marc 0·045 per cent., is equal to 1·33 per cent. of emetine, whereas the original assay of the root gave 1·32 per cent. This shows an experimental error of 0·01 in these estimations, demonstrating most clearly in our opinion the reliability of these processes for comparative use. Of this fluid extract one volume was then taken and made up to twenty volumes with sherry, the resulting wine being cloudy in appearance. After allowing to stand for forty-eight hours, a permanently bright wine (possessing to a very marked degree the characteristic odour of ipecacuanha) was obtained by filtration, the feculence being removed without the slightest difficulty. Estimated by the modified Ransom's process, to be described later on, it was found that a volume of this wine equivalent to 100 grams of root contained 1·285 grams of emetine.

It is proposed that the standard extract should be so adjusted in strength that 100 fluid parts should contain 1·25 parts by weight of emetine. This figure is suggested as being easily attainable from all samples of root that are fit for pharmaceutical use, and although lower than the average percentage of emetine as stated by Ransom, yet giving a wine considerably stronger than the present official one, as will be shown subsequently. The following, then, is the formula we propose for the fluid extract:—

Take of—

Ipecacuanha root in No. 20 powder	10 parts.
Slaked lime, freshly prepared . .	1 part.
Rectified spirit.	a sufficiency.

Moisten the drug with a small portion of the menstruum, pack firmly in a percolator, add more spirit, and when percolation commences close the lower end of the percolator and macerate for twenty-four hours. Then allow the liquid to pass until 8½ fluid parts have been collected; set this aside, continue percolation until the root is exhausted, drain well, and mix the lime with the marc. Allow them to stand in contact for twenty-four hours, then continue percolation until final exhaustion is completed. Recover the spirit from the last two percolates by distillation, dissolving the residual extract in the reserve. Take 20 cubic centimetres of this solution and estimate the amount of emetine therein as described above. From the result of this assay finally adjust the strength of the fluid extract so that 100 fluid parts shall contain 1·25 parts by weight of emetine.

The standard wine is then prepared as follows:—

Take of—

Standardized fluid extract of ipecacuanha	1 fluid part.
Sherry sufficient to produce .	20 fluid parts.

Mix, allow to stand for forty-eight hours, and filter.

In the preparation of the fluid extract, it will be remarked that the amount of extractive obtained after the addition of the lime is not very great. We have found, however, that it is relatively exceedingly rich in alkaloid. It may be suggested that it would be preferable to mix the lime with the drug at the commencement of the process, but we have found that exhaustion is more complete, and the resulting extract more satisfactory when the method we have indicated is followed. When the wine from the fluid extract was prepared, a sample was also made according to the official process from the same root. These were filtered at the same time and have since stood for six weeks side by side. We exhibit a specimen of each.

We have found that after standing for some weeks, the liquid extract of the original experiment has thrown down a deposit consisting of a mixture of amorphous matter, with a small crop of very distinct crystals. This deposit was collected and examined for alkaloid, from which it was found to be entirely free. The crystals were separated by washing cautiously with absolute alcohol, and when submitted to analysis were found to be a sugar which, as it exists, sparingly reduces Fehling's solution, but gives a very copious reduction after inversion.

We have again assayed the fluid extract after six weeks, and have found it to be of the same alkaloidal strength as when first prepared; viz., 100 fluid parts contain 1·285 per cent. of emetine, proving that the matter deposited in no way deteriorates the emetine strength of the preparation.

This we have adjusted to the proposed standard strength, viz., 1·25 per cent. of emetine.

Ipecacuanha Wine (British Pharmacopœia).

BY J. OLDHAM BRAITHWAITE AND JOHN C. UMNEY.

From the experience gained in the experiments just enumerated, it was thought probable that some definite information might be obtained by applying the lead acetate modification of Ransom's process to the wine itself.

Two hundred cubic centimetres of ipecacuanha wine, prepared from the standardized fluid extract, containing 1·25 per cent. of emetine, was cautiously evaporated to one-fourth that volume. To this liquid a slight excess of basic lead acetate was added, the precipitate separated by filtration, the excess of lead removed by sulphuretted hydrogen and filtration, the filtrate rendered faintly alkaline with ammonia, shaken with chloroform, the alkaloid washed out in the usual manner with acidulated water and the acid solution titrated with Mayer's solution. The amount of emetine found was ·1213 gram; that originally present in the amount of fluid extract taken (10 c.c. = 10 grams root) ·125, showing an experimental error of ·0037. This establishes the accuracy of the method as applied to the wine. From 2 ounces of the assayed root (containing 1·32 per cent. of emetine) 2 pints of the official wine was produced. Two hundred cubic centimetres of this wine, equivalent to 10 grams of root estimated as above, were found to contain ·0812 grams of emetine.

Twenty grams of the dried marc exhausted by means of ammoniated chloroform were found to contain only 0·0189 gram emetine or ·0945 per cent. Since the original root contained 1·32 per cent., and the sum of the alkaloid in the wine and marc = 0·907 per cent., there is a subsequent loss, equivalent to 0·413 per cent.

Cripps and Whitby* definitely show that the alkaloid emetine is decomposed by heat, a fact which the following two experiments confirm:—

(*A*) A dilute solution of emetine in acetic acid was prepared, of which 10 c.c. was found to contain by titration with Mayer's solution 0·095 gram alkaloid. Another 10 c.c. was evaporated to dryness and exposed on the water-bath for sixteen hours. The residue was then dissolved in dilute acetic acid and titrated. Only 0·068 gram of alkaloid was found, showing a loss of 0·027 gram, equivalent to 28 per cent.

(*B*) Another solution was prepared, of which a portion, 25·986 grams, was found to contain 0·2872 gram of alkaloid The remainder, 20·873 grams, containing 0·2303 gram emetine, was exposed on the water-bath for eight hours. The residue was redissolved and titrated when 0·1927 gram was found, showing a loss of 0·0376 or 16 per cent. of the alkaloid originally present.

* *Pharm. Journ.*, 3rd series, vol. xix., p. 723.

This amply confirms the opinion as to the detrimental effect of heat upon the alkaloid, but in order that the conditions might be exactly those which exist in the B.P. process, the following experiment was performed:—Fifty grams of root was mixed with 50 c.c. of acetic acid and exhausted precisely in the official manner. The percolate was cautiously evaporated to 100 c.c. and divided into two equal volumes.

One 50 c.c. was treated at once with basic lead acetate and the emetine estimated as described above when 0·308 gram was found.

The other half was evaporated to dryness, powdered, redissolved with dilute acetic acid and then treated in a similar manner and estimated. The amount of emetine found was 0·255 gram, showing a loss of 17·2 per cent. of the alkaloid. This extract was twelve hours upon the water-bath before it could be powdered. On the large scale it is our experience that it is necessary to expose the extract to a full water-bath temperature for from forty to forty-eight hours before a dry residue, which will keep permanently in powder, is produced.

In order to determine if we were singular in our results we have obtained a series of "trade samples" of the wine and submitted them to examination as to the amount of emetine contained.

In each case 200 c.c. of wine was treated by the basic lead acetate process described above.

No.	Emetine in 200 c.c. = 10 grams of root.
1	0·1077
2	0·0945
3	0·085
4	0·0756
5	0·0718
6	0·0699
7	0·0699
8	0·0699
9	0·0661
10	0·066
11	0·0378

These figures show that there is a general loss of alkaloid in the preparation of the wine. Seven out of the eleven samples examined, however, are very nearly of the same alkaloid strength. At the same time the variation between the first sample and the last is very wide.

Simultaneously we prepared a pint of the B.P. 1867 wine from our assayed root, and found that it contained 0·1228 emetine from the equivalent of 10 grams of root, showing that the old process practically exhausted the drug.

From these experiments we conclude—

(1) That the process of the present Pharmacopœia extracts practically all the alkaloid.

(2) That a considerable amount of the alkaloid so extracted is lost by the process of drying and powdering the acetic extract.

(3) That the wine produced is therefore far inferior in relative alkaloidal strength to the root, from which it is prepared.

(4) That the wine of the present Pharmacopœia, although undoubtedly a more "elegant" preparation than that of the 1867 edition, is considerably inferior to it in its chief therapeutic ingredient.

Note on a Volumetric Process for the Assay of Ipecacuanha Wine.

BY THOS. P. BLUNT.

Emetine, in common probably with other alkaloids, appears to react with Mayer's solution by removing the mercuric iodide from its solution in iodide of potassium; it is possible, therefore, to measure the amount of mercuric iodide thus removed by determining the solvent power of the potassium iodide set free upon more of the salt. In practice it is more convenient to add a solution of mercuric chloride of known strength, though in this case the mercury added is not equivalent, but only proportional to that removed. The process suggested consists in evaporating the ipecacuanha wine considerably, to remove alcohol, in which mercuric iodide is slightly soluble, adding excess of Mayer's solution, which must of course be saturated with the mercuric salt, filtering, and adding to the clear filtrate centinormal mercuric chloride solution until a permanent precipitate appears; this part of the process resembles that given in tne Pharmacopœia for the assay of hydrocyanic acid. After several trials the following plan was adopted:—50 c.c. of the wine are evaporated on the water-bath to 20 c.c., 10 c.c. of Mayer's solution are added, the precipitate is allowed to subside, and the solution passed through a dry filter 3 inches in diameter. From 25 c.c. to 27 c.c. will be recovered, according to the amount of the precipitate and its consequent absorptive power on the solution.

To the filtrate is now added cautiously, and with constant shaking, a centinormal solution (2·71 parts in 1000) of mercuric chloride, until a faint permanent cloudiness is observed. The quantity required will be from 4 to 6 c.c., and is most conveniently dropped in from a pipette graduated in tenths of a c.c.

The wine first tested by this process was a few months old; two trials gave in each case 4·2 c.c. as the quantity of mercuric chloride necessary to re-saturate the solution with mercuric iodide.

The second sample was a guaranteed one, obtained from a first-class wholesale house. The amount of the precipitate with Mayer's solution showed at once that it was much stronger in emetine than the previous specimen; two successive assays required 6·9 and 6·7 c.c. respectively of the mercury solution for saturation of the filtrate. The Mayer's solution is prepared by taking 100 parts of 10 per cent. solution of potassium iodide, adding saturated solution of mercuric iodide until there is a slight permanent precipitate, filtering, and making up to 200 parts with distilled water. It is clear that the exact strength of the solution is immaterial, but it must be added in excess to the evaporated wine.

The principle involved in the process given above is evidently capable of a much wider application; time, however, has not served for further work upon the subject, and in the meantime it seemed worth while to bring this preliminary note before the Conference, as supplying the pharmacist with a tolerably easy process for testing from time to time the quality of a preparation which is peculiarly liable to deterioration on keeping.

The PRESIDENT remarked that preparations of ipecacuanha seemed to be as much the *bête noir* of pharmacy now as they were twenty-seven years ago. He found one of the old papers sent out at Newcastle contained, amongst other things, as a suitable subject for examination, the deposit in ipecacuanha wine, and pharmacists were still working very much in the same direction, although no doubt in the meantime a great deal had been done. There were several gentlemen present who had worked on this subject, amongst them being Mr. Ransom, who had done a great deal with reference to the standardizing of drugs, and they all knew that his investigations were most thorough, and this was not the only subject he had dealt with with very great success. Sir Dyce Duckworth had also given a paper on the exhaustion of ipecacuanha root by acetic acid, Mr. Carteighe having made the preparations for him. The mischief, no doubt, of using acetic acid in extracting ipecacuanha for the production of wine was the destruction of the alkaloid by the heat to which it was subjected in order to drive off the

acid. His son had pointed out that they found forty hours heating on the water-bath was necessary to get the extract into condition for powdering, and there could be no question whatever that if emetine was destroyed by heat this process must be objectionable. It was far preferable to make the preparation by putting the fluid extract of such a strength as 1 in 1 into wine, especially when it was quite clear that the ipecacuanha wines of the present day were anything but uniform, some samples yielding twice as much alkaloid as others.

Mr. RANSOM congratulated the authors of these papers on having at last found a process which answered so well for the estimation of alkaloid in both extract and wine. The process he had suggested did not work out sufficiently well to justify its being recommended for the extract. The variety of roots imported and the difference of alkaloidal values was quite sufficient to account for a considerable difference in the wines and extracts, and taking into consideration also the heat employed in drying the extract, it was evident that there would be a great advantage if they could secure a standardized preparation of this drug; he hoped this might soon be accomplished.

Mr. MARTINDALE congratulated Mr. John Umney on the success of his paper, which appeared to describe a process superior to the acetic acid one, to which there were several objections. It was slow, and there was much too great a quantity of fluid used in extracting the drug, which required a long time both in percolation and evaporation, and this must be detrimental to the product. It was very difficult to evaporate the extract down to the condition in which it would powder, and the process with slacked lime and rectified spirit would probably have a better result. The proof of this was that it yielded a certain amount of alkaloid after a fair time of keeping. In the United States Pharmacopœia the formula for the fluid extract had been changed two or three times. They first had an alcoholic extract treated with acetic acid, thinking that would preserve the liquid from that unsightly deposit that nearly all preparations of ipecacuanha formed, except the wine of the British Pharmacopœia, which did keep bright. He had tried another American method, in which glycerine, water and spirit were used. It made a thick mucilaginous preparation, containing some substance allied to bassorin, which when added to wine really did not make a preparation superior to our old wine. Getting the alkaloid into a free condition was a step in the right direction, it being desirable to get rid of the vegetable acid with which it was combined, which had been looked upon as being mostly the cause of the deposit that formed in the old ipecacuanha wine.

Mr. REYNOLDS also congratulated Mr. John Umney upon his paper, which seemed to be especially fortunate in its practical results, and the thoroughness with which the experiments had been carried out. It was most unsatisfactory that after a quarter of a century progress in this matter seemed to be backwards, for they had been making ipecacuanha wine under the authority of their rulers worse than it was before. He believed if the formula now in the British Pharmacopœia had been submitted to a meeting like that the amount of doubt thrown upon it, especially with regard to the desirability of heating such a substance too long, would have prevented its being officially adopted, but so long as pharmacists were not allowed to have much to say about pharmacopœias these mistakes would occur. He hoped, however, that the circumstance of one mistake of this kind being corrected might be some protection against a future crop.

Mr. NAYLOR said he had not made many experiments on ipecacuanha since those he reported to the Aberdeen meeting, the result of which pointed to acetic acid as being the best solvent. A short time afterwards he found that some of his results were rather low, because in estimating the alkaloids he treated the fluid with lime, and evaporated down the residue to dryness. On seeing Mr. Ransom's results he made further experiments, and found that his results were much too low. Still they were strictly comparative. What he wished to point out was this: he had, he was afraid, ever since been guilty of a gross departure from the official formula in making the vin. ipecac. of the British Pharmacopœia, as he always used acetic acid as there stated, but he never evaporated quite to dryness and reduced it to powder, because he knew by direct experiment that the emetine really suffered by that process. He was extremely gratified to find that Messrs. Braithwaite and Umney now brought the matter forward in an official form, and hoped it would receive recognition in another quarter, so that they might no longer labour under the delusion that they had emetine in the wine, when in point of fact it had been decomposed. He hoped also that before long they would gain a recognition of a standardized fluid extract, that of the American Pharmacopœia being very defective.

Mr. CONROY heartily congratulated Messrs. Braithwaite and Umney on the excellence of their paper. He was very pleased to find that the wine of the old Pharmacopœia of 1867 turned out so well. That preparation had always been a great favourite with him, when made in a way he explained at a previous meeting, namely, to macerate the whole root in the wine, using a wine of good alcoholic strength. At the same time he was pleased to see the excellent results obtained by the authors of this paper. The extracts which had been shown seemed everything that could be desired, and the sample of wine also. The process in the Pharmacopœia ought certainly to be discarded, and they should either revert to the old process of making and using the whole root, or having a standardized fluid extract like this.

Mr. BARCLAY (Birmingham) congratulated not only the authors of the paper, but also the President, and ventured to predict that if Mr. John Umney continued to work in the same direction as he was doing now some of the younger members would live to see him occupy a very distinguished position in connection with the Conference. Now it was made plain that heat had the effect of destroying the emetine one practical outcome of the paper would be to show that it was not only necessary to standardize the drug, but to standardize the preparation. Even if drugs themselves were standardized, preparations made in different ways by different houses would be found to vary very much, and it would be necessary in the next Pharmacopœia that many preparations should also be standardized. He hoped that in future Conferences this question would be kept to the front, as it was of the utmost importance.

Mr. MABEN thought after this excellent paper ipecacuanha need not be their *bête noir* much longer. He was rather glad to find that it had been proved that evaporation to dryness destroyed a certain amount of emetine, for he had suspected that in the beginning. Like Mr. Proctor he had experimented *in corpore vili*, and found ipecacuanha wine not so effective as it was said to be. After that he did not evaporate to dryness, but always retained a certain portion of the fluid, and since that time the wine had been very good. He took the additional precaution of separating the tannin from the wine that he employed, because he had an impression that that tended to precipitate emetine. With all deference to Mr. Conroy and to the authors of the paper he did not think the 1867 wine was so good therapeutically, at least it did not keep so well as the present wine did, and he believed the experience of pharmacists would corroborate what he said.

The PRESIDENT said no doubt Mr. Conroy and others

who operated on a large scale would bear him out that they were very much at sea at times on account of the varying yield of the products. Sometimes it was as low as about 15½ per cent. with the acetic acid extraction when dried and powdered, and sometimes it went up to 23½ per cent., and to bring it to something like uniformity they diluted it up to 25 per cent. with sugar of milk. He therefore hailed the introduction of a standardized fluid extract very heartily.

Mr. J. C. UMNEY in reply said Mr. Maben had misunderstood him with regard to the 1867 wine. The only remark he made about it was that it was very good as far as the emetine strength was concerned, but as to its elegance he said nothing, except that the present wine was more elegant. With regard to Mr. Naylor's remarks he could only repeat that they found that acetic acid completely exhausted the ipecacuanha.

The following two papers were then read :—

NOTE ON HYPOPHOSPHOROUS ACID AS A SOLVENT OF STRYCHNINE AND MORPHINE.

BY H. W. JONES, F.C.S.

In searching for readily soluble salts of strychnine and morphine for hypodermic medication, I was struck with the extreme solubility of both alkaloids in dilute hypophosphorous acid ; and the ease with which these alkaloids dissolve to form neutral, or practically neutral solutions when hypophosphorous acid is employed points to a possibly advantageous use of such compounds for hypodermic injections.

In the case of hypophosphite of strychnine it appears to be a very stable salt in solution ; and hypophosphorous acid might, I think, be usefully employed, not only to form a hypodermic injection, but in place of the hydrochloric acid ordered for making liq. strychninæ (B.P.), as the official preparation sometimes gives trouble in cold weather from separation of crystalline matter.

The morphine combination also appears to keep better in solution than the acetate, and would more easily afford a stronger solution than the official inject. morphinæ hypoderm. in cases where such was required. A solution 1 in 6 is sometimes wanted, and the ready solubility of hypophosphite of morphine allows of this being easily made, or even of a very much stronger solution. Thus, for a concentrated injection intended for veterinary use I found no difficulty in preparing a solution four times the strength of the official injection.

The solutions produced with hypophosphorous acid, and using a slight excess of morphine or strychnine, are neutral, or only very faintly acid. In the case of morphine I have found it advantageous to make a decidedly strong solution, to estimate the morphia, and dilute to the required strength; and a similar method may obviously be followed with regard to strychnine.

Morphine hypophosphite is so readily soluble that crystals only separate from a thick syrupy mother-liquor after keeping for some time.

Strychnine hypophosphite can be more easily obtained, as though exceedingly soluble, the highly concentrated solution solidifies on cooling to a crystalline mass from which the salt can be separated.

The salts of both alkaloids would well repay a more extended examination, both as to composition and solubility.

NOTE ON A NEW MODE OF APPLYING CHLORIDE OF METHYL.

BY W. MARTINDALE, F.C.S.

Among the residual products obtained in the manufacture of alcohol from the molasses of beet-root sugar, is trimethylamine, which when purified and converted into a chloride is decomposed by the action of heat into chloride of methyl, ammonia, and trimethylamine again. These are conducted into vessels containing hydrochloric acid, the ammonia and trimethylamine form salts, while the gas of chloride of methyl passes into a gasometer, from which it is compressed by an air-pump. The latter is largely used in France for the manufacture of methyl compounds, such as methylaniline and the new antipyretic exalgine (methylacetanilide). The tension of its vapour not being high, and not increasing very rapidly with the temperature, under a pressure of about six atmospheres its liquefaction is easily effected, and as a commercial article it is sold in the compressed liquid form, in copper cylinders. In this liquefied condition it is a powerful refrigerating agent. When allowed to escape from the cylinder into an open vessel, it begins to boil, and in a few moments the temperature of the liquid is lowered by the ebullition about 75 degrees Fahrenheit below the boiling point of the chloride. It is therefore employed in the arts like ether, for freezing purposes. For medicinal use, a pulveriser is attached to the portable cylinder, so that as the chloride is emitted, it vaporises and produces intense cold. It can thus be applied in a direct stream which should fall obliquely, not perpendicularly, on any part requiring its congealing action, either as a local anæsthetic or for relieving neuralgia, sciatica, and other affections. Without the use of a pulveriser, the jet of gas is apt to take an uncertain direction, owing to the aperture becoming blocked with particles of ice.

Another form of applying it, to which I more particularly wish to draw your attention, is that in which the chloride of methyl is contained in a liquid form in what is called a thermo-isolator. If a little of the liquid chloride be drawn into a beaker, it boils rapidly and is volatilized almost immediately, but in the thermo-isolator it may be retained for some time at the ordinary temperature, so that tampons may be dipped in it and applied to any part of the body requiring its use. The thermo-isolator is simply a glass test-tube, fused at the top to a larger outer surrounding tube, with a vacuum intervening, which acts as a non-conductor of heat, or as it is termed, a thermo-isolator.

The application of chloride of methyl requires care, as, if freely used, it is liable to cause ecchymosis, but it appears to be non-poisonous, as I recently witnessed in Paris a patient suffering from facial neuralgia apply a jet of it freely along the lower jaw and side of the face, afterwards repeating the process along the gum inside the mouth. This he applied daily, and said it was the only thing that gave him relief.

At the conclusion of this paper Mr. Martindale demonstrated the use of the apparatus and the Conference adjourned until the next day.

(*To be continued.*)

The British Association for the Advancement of Science.

ADDRESS TO THE CHEMICAL SECTION.

BY SIR LOWTHIAN BELL, BART., F.R.S., F.C.S., D.C.L., M.INST.C.E.

(*Continued from page* 240.)

There is, however, another way of securing this prolonged exposure of the ore to the action of the reducing gas without incurring the inconvenience just referred to, viz., by increasing the dimensions of the furnace blown with cold air. When this was done by raising the height from 48 to 71 feet it was found that the duty performed by the coke, apart from the heat contained in the blast, was just about the same as that in the hot blast furnace.

With regard to the position of equilibrium above referred to, it is worthy of remark that, while this was reached when a furnace of 48 feet ran 100 tons per week when driven with cold air, it was not arrived at in one of similar dimensions using heated air until the make was increased to about 220 tons.

When we proceed to examine the composition and weight of the gases given off by a 48 feet furnace blown with air at 485° C. it will be found that about 20 per cent. of the carbon as dioxide has disappeared, due no doubt to the still excessive temperature of the upper zone and too rapid a current of the reducing agent. An obvious way to remedy this evil would be by an addition to the capacity of the furnaces. This was done by raising them to a height of 80 feet, with a cubical space three or four times greater than those of 48 feet. In such a furnace almost the full theoretical quantity of carbon as dioxide has been obtained, but while the larger furnace held three or four times as much ore, etc., the production was only about double that of the lesser. On referring to Table II. it will be seen that a further economy of 6·6 cwts. of coke has been effected in furnace C as compared with B, due solely to an enlargement of space, for the temperature of the blast was exactly the same in both. This improvement, it will also be perceived, is due to an extension of those causes which acted so beneficially when hot air was applied to B.

If 6·6 cwts. of carbon or thereabouts is the full quantity per ton of iron which can be found in the gases as dioxide, and if in a furnace working under the conditions of C, it requires 22·32 of coke to furnish this carbon and that in the carbonic oxide, it is clear we cannot withdraw any coke without disturbing the position of equilibrium supposed to have been established in the case of the furnace in question. Suppose into such a furnace the blast, instead of 485°, is admitted at 695°, as happened under column D. The additional heat, 732 calories, instead of 534 as in C, will make itself felt throughout the entire height of the furnace, including, of course, the upper zone. Immediately this happens the carbon dioxide generated by the reduction of the ore attacks the coke and escapes as carbonic oxide. If Table I. is examined it will be seen that almost the whole of the additional heat carried into the furnace D, as compared with C, has been absorbed by the disappearance of carbon dioxide, so that the net power of the coke unit in both cases is practically the same. Nevertheless it will be remarked that there is still a small saving of coke due to a reduced amount of blast, escaping gases, etc.

From what has preceded it has been concluded that a furnace of 80 feet affords sufficient opportunity for the gases being as fully saturated with oxygen as the nature of the process of deoxidizing the ore will permit. The sensible heat in the escaping gases, however, still represents a considerable loss, reduced as they have been from 29,482 to 11,043 calories.

According to estimate it was believed that the reduction of oxide of iron ought to be attended by an increase of temperature—in other words the conversion of carbonic oxide into carbonic dioxide produced more heat than that absorbed by splitting up oxide of iron into its constituent parts. The estimated difference not being a large one, an experiment was made by substituting in the furnace inert substances having about the same specific heat as the ore. The results confirmed the correctness of the calculation—the temperature of the escaping gases fell, and rose to their normal point when the use of ore was recommenced. A more expensive experiment was subsequently made in the same direction by building, at Ferryhill, a pair of furnaces having a height of 103 feet, without any substantial benefit being derived from the large additional expenditure incurred.

It was Scheerer, I think, who first divided the blast furnace into zones. The first division, beginning at the top and extending 12 feet downwards, was designated the preheating zone; the following 18 feet downwards was distinguished as the reducing zone; the next 8 feet the carburizing zone, followed by four feet which constituted the zone of fusion. The lowest of all, having a depth of about six feet, was named the zone of combustion. The author of this mapping out, as it were, the interior of the furnace does not wish to be understood as confining its various functions within the respective spaces assigned to them; on the contrary, he admits the existence of considerable variations of position. My own observations, however, have led me to conclusions varying considerably from those adopted by Scheerer.

The fundamental cause of these differences seems to depend on the temperature considered as being required for a commencement of the reduction of the ore. By Scheerer the reducing zone is considered to require a temperature of 1,000° to 1,200° C. This change undoubtedly is not the same with all kinds of ores, but my experiments were conducted when using almost every variety of the mineral. According to the trials made a mixture of one volume of carbon dioxide and two volumes of carbonic oxide at a temperature of 410° removed 10 per cent. only of the oxygen in Cleveland ore, and 37·8 per cent. from an artificially prepared oxide. The composition of the gases at the different depths, however, indicates in an unmistakable manner the nature of the action which is going on at any particular point. A table has been prepared from actual analyses of the gases which gives the quantity of oxygen present for every 1,000 parts of metal produced; and to this is added the weight of carbon they contained. The results vary, but the general inference to be drawn from the observations made on furnaces of 80 feet is that by the time the minerals have passed through a space of 8 feet of the depth they have to travel all the oxygen susceptible of removal from the ore in the upper region is found in the gases, the remainder being retained until it reaches the zone of fusion. The same is the order of action in a somewhat modified form which was found to prevail in the case of furnaces 48 feet in height.

On casting the eye along the lines of figures a somewhat remarkable circumstance is apparent, viz., that the quantity of oxygen per 1,000 of pig-iron gradually decreases as the gases ascend, until they approach the upper region, when it commences to increase. This had been the subject of observation for many years without any complete explanation being given of its cause. Dr. Percy, among others, bestowed some attention to the circumstance without arriving at any opinion satisfactory to himself. It is a little extraordinary, so far as I have seen, that no notice has ever been taken of the fact that the carbon in the gases followed the same law. While engaged in investigating the action of furnace gases on the ore a peculiarity was observed previously unknown to me, viz., that large quantities of carbon were deposited by the dissociation of the reducing gas, the action being $2\,CO = CO_2 + C$. Experimentally I ascertained that spongy iron, as well as oxide of iron, was capable of producing the change, and that 30 per cent. of carbon dioxide, mixed with the carbonic oxide, arrested the reaction, the temperature at the time being 420°. Dr. C. A. Wright, who subsequently became chief chemist of our laboratory, was asked to continue the examination. The conclusion arrived at was the impossibility of effecting the complete reduction of Fe_2O_3, or of any oxide, by CO. On the contrary, when metallic iron known to contain no oxygen was exposed to a current of this gas carbon was deposited and oxygen absorbed. It would seem, therefore, that this absorption of oxygen by the iron and precipitation of carbon suffice to explain the disappearance of these two elements from the gases,

TABLE III.—*Showing the quantity of Oxygen and Carbon in gases per* 1000 *parts of Pig Iron produced. The* 8 *feet immediately below charging plates is occupied by charging apparatus.*

Distance below top of Minerals.	0 ft.		8½ ft.		18 ft.		31 ft.		44¼ ft.		57 ft.		62½ ft.		69 ft.	
	O.	C.	O.	C.	O.	C.	O.	C.	O.	C.	O.	C.	O.	C.	O.	C.
No. 1. Oxygen	1843	—	1250	—	1235	—	1234	—	1236	—	1207	—	1137	—	1348	—
Carbon	—	1101	—	864	—	816	—	871	—	904	—	899	—	890	—	967
No. 2. Oxygen	1843	—	—	—	1410	—	1482	—	1190	—	1207	—	1255	—	1366	—
Carbon	—	1104	—	—	—	914	—	1046	—	894	—	887	—	—	—	927
No. 3. Oxygen	1670	—	1309	—	1206	—	1312	—	1256	—	1253	—	1253	—	1378	—
Carbon	—	1048	—	926	—	907	—	918	—	946	—	931	—	939	—	1013
No. 4. Oxygen	1670	—	1271	—	1224	—	1300	—	—	—	1261	—	1285	—	1387	—
Carbon	—	1048	—	897	—	898	—	917	—	—	—	926	—	977	—	1021

NOTE.—Nos. 3 and 4 were usually partially calcined limestone, hence the deficiency of O. and C. until the lower depths are reached.

TABLE IV.—*Showing what may be regarded as a typical instance of the absence of Carbon Dioxide in the gases taken from a furnace of* 80 *feet. Measurements taken from the highest level of the minerals, i.e.,* 8 *feet below charging plates.*

Depth below charge.	Escape pipe.	3½ ft.	9¾ ft.	16 ft.	22½ ft.	28¾ ft.	35 ft.	41¾ ft.	66 ft.
Carbonic acid . .	16·07	11·71	10·03	8·17	6·12	—	—	·72	3·01
Carbonic oxide .	27·34	29·71	31·39	31·40	32·79	35·27	36·00	36·02	39·47
Hydrogen . . .	·11	·10	·07	·14	·28	·10	·11	·08	·14
Nitrogen . . .	56·48	58·48	58·51	60·29	60·81	64·63	63·89	63·18	57·38
Total	100·	100·	100·	100·	100·	100·	100·	100·	100·

and that they remain in this condition until the fusion of the iron in contact with intensely heated carbon, liberates the oxygen as well as that portion of the carbon which is not absorbed by the metal in order to produce pig-iron.

So far, then, as the analyses given in Table III. enable us to judge, instead of the upper two-thirds of a furnace being required for the purposes of reduction, no material change is effected after passing through 18 feet in a modern furnace of 80 feet in height. After this the composition of the gases, and, therefore, of the minerals, remains pretty steady until the vicinity of the tuyères is reached, with the consequences already referred to.

Of the excess of oxygen at the zone of combustion it is highly probable that a portion is due to the reduction of P_2O_5, SO_2, SO_3, and CaO. In the case of Cleveland iron I have estimated this at 54 parts per 1000 of pig-iron produced, but the average total oxygen beyond that furnished by the blast in the first two instances given was 130 parts. At this rate there must have been 76 parts of oxygen liberated from the oxide of iron, which is equal to 19 per cent. of that originally combined with the iron in the ore.

It may be appropriate here to refer to what may be taken as a typical expression of the working of a blast furnace in respect to the presence of carbon dioxide. An analysis of the gases is therefore inserted, drawn from an 80-feet furnace at various levels, with the simple remark that it is improbable that carbon dioxide can exist for any length of time when exposed to incandescent coke at the temperature which prevails at the depths mentioned in the last two columns.

Something like forty years ago the escaping gases from the blast furnaces, rich as they were in carbonic oxide, were permitted to burn wastefully on the surface of the minerals charged at the throat. This meant a loss of about 54 per cent. of the heating power of the coke. For reasons already given it was of course impossible to utilise much of this heat in the actual smelting of the ore because of the necessity of preserving a large excess of carbonic oxide in the gases. This, however, constituted no reason why, apart from the furnace work itself, this vast quantity of gaseous fuel should not have been utilised, as it no doubt would earlier have been, had the ironmakers known, as they now do, its full value. To-day all the blast and other engines are driven and the air is heated at our blast furnaces by fuel formerly wasted, and this without any labour for stoking being required. In Great Britain alone the annual saving is fully equal to four million tons of coal.

In connection with the other volatile products which accompany the iron smelters' work I will only mention ammonia. Some qualities of coal admit of being used in the raw state. In this case, as in distilling coal for illuminating purposes, ammonia is generated and may be collected. Instead, however, of the ammoniacal vapour being all contained in the hydrocarbons as in gas-making, it is diluted in addition with all the fixed carbon as oxides and all the nitrogen of the atmospheric air used in its combustion. Nevertheless, Messrs. Bairds, of the Gartsherrie works, and others, are manufacturing large quantities of ammonia sulphate from the ammonia so obtained. A similar object is achieved by attaching the necessary condensers to the apparatus for coking coal. The process of distillation is then carried on in hermetically closed ovens heated by the combustion of the gases evolved. These, before reaching the fire-place where they are burnt, are deprived of their ammoniacal vapours by passing through condensers provided for the purpose. Previous, however, to this being done, the waste heat from the coking process had been applied for generating steam, so that at certain collieries in the county of Durham all the mechanical power is obtained without any coal being specially burnt for this purpose.

Before speaking of the next and last great improvement in connection with my subject, I should like to say a few words, and a few words only, respecting steel, a well-known and most valuable compound of iron and carbon. Let me first observe that it seems

improbable that this substance was not earlier known to the ancients, as was at one time supposed. The facility with which the metal combines with carbon renders it very unlikely that acieration would not occasionally take place when iron itself was the object of the manufacturer. Certain it is that Agricola, who wrote in 1556, describes in Latin a mode, apparently as well known as that of making iron itself, of making *acie*. The engraving in his "De re metallica" shows bars of malleable iron placed upright in a charcoal fire resembling that of a Catalan hearth. These, after an exposure of several hours to the incandescent charcoal and hot carbonic oxide, were found changed to steel and employed as such.

(*To be concluded.*)

Provincial Transactions.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The annual meeting of this Society was held on Wednesday, September 18, in the new premises, New Surrey Street, the President, Mr. Radley Learoyd, in the chair. Two associates, Messrs. Dalton and Moffat, were appointed scrutineers for the counting of voting papers for the election of the Council for the ensuing year.

The minutes of the last general meeting having been read and confirmed the President called upon the Honorary Secretary to read the Annual Report:—

The Council in presenting the Report congratulated the members on the continued success of the Society, the number of members and associates now numbering 51 and 35 respectively, and it was hoped that the coming year might see a further addition to the strength of the Society. A number of papers and lectures had been given at the general monthly meetings, most of which have already been recorded in this Journal.

The inaugural meeting of the fourth session of the School of Pharmacy was held in the Montgomery Hall, on Wednesday, October 10, when the prizes were distributed and an address delivered by Dr. Symes, of Liverpool. The past session had been one of prosperity, the number of students having entered being forty, an increase of twenty, the average attendance being 82 per cent. The lecturers had reported well of their classes and the results of the examinations were highly satisfactory, the following gentlemen taking the prizes: Practical Chemistry, A. Barrett (also Lecturer's prize); Botany (1), C. D. Moffat (Mr. Fox's prize), (2), C. H. Twelves; Pharmaceutical Chemistry (1), C. H. Twelves, (2), C. D. Moffat; Materia Medica (1), Sydney Smith, (2), C. H. Twelves; President's prize (in all subjects), Sydney Smith.

The staff of Lecturers is now as follows:—Botany, Mr. J. Humphrey; Pharmacy, Mr. G. Ellinor, Ph.C.; Materia Medica, Mr. R. Watts, Ph.C.; Practical Pharmacy, Mr. G. A. Grierson, F.L.S.; Chemistry, Mr. S. Rhoden; Practical Chemistry, Mr. J. H. Worrall, F.C.S., F.I.C. The Council deeply acknowledged the unabated interest of the Lecturers in their respective classes.

Owing to the increased attendance at the School, the Council had had once more to consider the question of accommodation. Eligible rooms in New Surrey Street being at liberty, which in every way seemed desirable for the carrying on of the Society's work, they were acquired. A fund called "The School of Pharmacy Fund" had been established for the purposes of the school, and out of which the furnishing of the laboratories would be defrayed. The promises and donations received amounted to £30, and the Council appealed to all interested to make the fund a success.

In conclusion the retiring Council appealed to the pharmacists of Sheffield for increased support to their successors, so that the sphere and usefulness of the Society may be extended.

A duly audited statement of accounts was presented which showed an improvement in the financial condition of the Society.

The President moved the adoption of the report and invited discussion, but as the feeling of the meeting was one of entire satisfaction the motion was immediately seconded by Mr. S. Lowe and unanimously carried.

The scrutineers at this point handed in their report, when it was found that the following gentlemen were elected to serve on the incoming Council:—Messrs. Bradwall, Ellinor, Fox, Grierson, Humphrey, Learoyd, Morrison, Newsholme, Preston, Rhoden, Ward and Watts.

Mr. McLeod proposed and Mr. Lowe seconded a vote of thanks to the retiring Council, to which Mr. Humphrey replied.

Mr. Newsholme proposed and Mr. Preston seconded a vote of thanks to Mr. Learoyd. Both gentlemen referred to the President's conspicuous ability in the chair, and to his untiring energy displayed throughout the year for the benefit of the Society.

The President in replying freely expressed his opinions, and spoke encouragingly of the Society's position.

With other votes of thanks the meeting terminated.

Mr. Bingham, of Masboro', and Messrs. Cowan and Wilkinson, of Worksop, were elected associates.

On Monday, September 23, the new Council met for the election of officers, when Mr. A. R. Fox was elected President, Messrs. J. H. Bradwall and G. A. Grierson, Vice-Presidents, and Messrs. G. T. W. Newsholme, C. O. Morrison and C. D. Moffat were re-elected treasurer, secretary and librarian respectively, and Messrs. R. W. Watson and J. F. Eardley, auditors.

With votes of thanks to the retiring President and others the meeting closed.

It was announced that the inaugural meeting of the School of Pharmacy will take place in the new premises, New Surrey Street, on Thursday, October 10, when S. R. Atkins, Esq., J.P., of Salisbury, will deliver an address. The annual dinner will be held immediately after the meeting in the Masonic Hall.

Parliamentary and Law Proceedings.

Poisoning by Strychnine Vermin Killer.

On Saturday, September 21, Mr. A. Braxton Hicks, the Mid Surrey coroner, held an inquiry at the Star and Garter, Church Road, Battersea, into the circumstances attending the death of Sarah Godwin Housdon, aged 19 years, who committed suicide by taking strychnine in the form of Battle's vermin killer.

Mrs. Hannah Housdon, wife of a refreshment housekeeper, carrying on business at 26, Queen's Crescent, Battersea, stated that deceased was her niece, and had been in her service as an assistant for about six years. Latterly she had suffered very much from the toothache, and only a few days since had three teeth extracted. She had been rather low-spirited for some time, but witness could not attribute it to any particular cause. She did not know whether she had a sweetheart.

Saxby, the coroner's officer, said the girl was keeping company with a young man living three or four doors from the witness's shop.

Mrs. Housdon, continuing, said that her niece did her work as usual on Monday, and went to bed at 10 o'clock. At midnight witness was about to retire to rest when she heard the girl calling her. Upon going

to her bedroom she found the door locked on the inside, and on bursting it open she discovered the deceased lying on her stomach and screaming with pain. At first she said she had got the cramp, but when witness threatened to send for a doctor she admitted having taken rat poison. Asked why she had done so she replied, "I took it on the impulse of the moment and am very sorry for it." Emetics were administered and a medical man was summoned. Witness could not induce her to give a reason for committing the rash act. She lived very happily with them, and had never threatened to destroy her life. The packet of Battle's vermin killer produced was found in her dressing-table drawer. It was of a bluish colour.

Dr. George F. Burroughs deposed that at an early hour on Tuesday morning he was called to the deceased, who was suffering from the effects of strychnine poisoning. She expired on the following day. In reply to his question, the deceased said she had a sweetheart, but he could not learn upon what terms they were.

By the Coroner: Battle's vermin killer contained strychnine, but he also found traces of what he took to be arsenic in the stomach. The girl told him that she purchased the poison at a chemist's shop, and that a young man served her. Witness did not consider it prudent to serve a young girl like her with strychnine.

Mr. Alfred Evans, manager to Messrs. Foster and Dallas, chemists, of 1, Lavender Hill, Wandsworth, who had been sent for by the coroner, produced his poisons sale book, from which it appeared that on Sunday evening, September 1, 6d. worth of Battle's vermin-killer was purchased by "S. Godwin, of 26, Queen's Crescent, for rats." Witness explained that he was at church at the time and the girl was served by his assistant, who was twenty-one years of age and unqualified; and who, moreover, according to the book, introduced the customer, a witness being necessary. They never sold the poisons mentioned in Schedule A to persons they did not know.

The Coroner said it was evident that the assistant did not know the deceased, who did not give her surname. It was perfectly alarming that poisons should be sold in that loose manner, for people were really at the mercy of their servant girls. Then, again, it was an offence against the law for an unqualified assistant to sell poisons, and he should certainly report the matter to the Pharmaceutical Society.

The jury returned a verdict "That the deceased committed suicide while in a state of unsound mind," and strongly condemned the action of the assistant, who, being unqualified, sold strychnine to a person he did not know.—*Times.*

Liquor Potassæ supplied for "Fluid Magnesia."

At the Central Criminal Court on Saturday, Sept. 21, George Henry Hill surrendered to his recognizances and was indicted for the manslaughter of Lucretia Lydia Goodman.

It seemed that the defendant was a lodger in the house of a chemist in Battersea, and it was stated that the arrangement between him and his landlord was that the defendant was in the evening to assist the chemist in the shop. The defendant was a pipe rack manufacturer by trade. On the evening of July 10 the defendant was serving in the shop when a nurse came in and asked for some fluid magnesia for a child who was suffering from thrush. The defendant put some fluid in a bottle, and having labelled it "fluid magnesia" he handed it to the nurse. The fluid was given to the child, which subsequently died, and it was discovered that instead of being liquid magnesia, the fluid which the defendant had put into the bottle was liquor potassæ. It was stated that the defendant had served in the shop for two or three years, but was not allowed to serve registered poisons. When the fluid was given the child vomited, and was taken to the chemist's shop, and the chemist administered an antidote. It was pointed out that liquor potassæ was not one of the poisons mentioned in the schedule of the Act of Parliament. The defendant was a well educated man who had patented an invention for pipe-racks. It was stated that the defendant had never made a mistake before. The defendant was examined as a witness at the inquest, and stated that to the best of his belief he took the liquid from the fluid magnesia bottle.

Dr. Stevenson was called as a witness, and gave evidence as to having analysed the liquor potassæ.

Mr. Fulton, in addressing the jury for the defence, said the defendant took down the wrong bottle, and it was a pure misadventure which might happen to any one. There had been no negligence on the part of the defendant, and he was therefore entitled to be acquitted.

Mr. Justice Charles having summed up,

The jury returned a verdict of not guilty.—*Times.*

Obituary.

Notice has been received of the death of the following:—

On the 22nd of September Mr. Charles Heaton Sharples, Chemist and Druggist, Fishergate, Preston. Aged 40 years. Mr. Sharples was an Associate of the Pharmaceutical Society.

On the 23rd of September, Mr. John Whimpray, Market Street, Lancaster. Aged 78 years.

Correspondence.

The Solubility of Glass.

Sir,—About three weeks ago I was requested to examine a peculiar deposit which had formed in white glass vessels intended for exhibiting water from the Holy Well on the Malvern Hills. The bottles were of one gallon capacity, and from the time when filled, about five years ago, had been kept undisturbed. A beautiful, apparently crystalline incrustation had almost completely covered the sides and bottom, and as the water when collected at the spring contains only 6·5 grains total solids per gallon the excess of solid matter was, after some experiments, stated without hesitation to be siliceous matter derived from the glass. Being compelled to admit only a slight practical experience as to the prolonged action of highly dilute solutions on various kinds of glass my opinion was somewhat incredulously received, and smaller bottles were shown which had been filled sixteen years and absolutely free from deposit. This, however, seemed confirmatory not of the special solvent power of the water, but of the peculiarity of the make of glass, which deserves thorough investigation.

As I am looking up information on the subject the recent paper by Mr. Reynolds and subsequent discussion at Newcastle has to me, personally, been most opportune, and perhaps further correspondence may afford more facts bearing on this interesting, though scarcely considered, point of high practical importance to pharmacists.

Malvern. Alfred Mander.

J. W.—No doubt ammoniated mercury would be found in proportion to the ammonia present.

E. E. Rowland.—Rubbing the figures with a brush dipped in oil would probably be sufficient for the purpose.

W. J. Shepherd.—(1) *Hyoscyamus niger.* (2) *Amaranthus* species: not British. (3) *Polygonum Fagopyrum.* (4) *Verbena officinalis.* (5) *Gentiana Amarella.* (6) *Anagallis cærulea.*

Communications, Letters, etc., have been received from Messrs. Ashe, Williams, Dott, McLaren, Groves, Woolley, Branson, Reynolds, One who Knows, R. J.

INTRODUCTORY SESSIONAL ADDRESS

DELIVERED AT THE

COMMENCEMENT OF THE FORTY-EIGHTH SESSION OF THE SCHOOL OF PHARMACY,

October 2, 1889,

BY PROFESSOR JOHN MARSHALL,

F.R.S., LL.D., F.R.C.S., M.CH. (HON.), ETC.,

President of the General Medical Council.

Introductory.—Mr. President, Ladies and Gentlemen,—When, a few days since, I perused the addresses which had been delivered in this theatre on five similar occasions to the present one, dealing with various questions of interest in relation to your Society, I realized the seriousness of the duty which I had perhaps somewhat hastily consented to undertake. But when, having read those discourses, each so excellent in its way, I laid them aside and turned to that solid volume, your Calendar for 1889, I took heart of grace; for I speedily discovered that if my own words should fail, I might appeal to the silent eloquence of that substantial record. Moreover when, under the guidance of your President, I had visited this Pharmaceutical Habitation with its ever expanding accommodation, I felt, as a practical educationist, that I could hardly fail to find some fit topics wherewith to occupy the brief moments at my disposal.

Past History.—Not yet quite half a century ago the actual foundation of your Society was laid within the memory of many still living, but it is easy to imagine that its conception in the minds of its distinguished founders was not the impulse of a moment, but the thought and hope of many antecedent years. I need not here record the names of those energetic pioneers, so familiar to us all, nor will I venture to particularize any of them at the cost of those whom I might wrongly omit to mention, but I must be allowed to express my sincere admiration of their sagacity, prevision and prudence in not attempting to compass all their manifest intentions at once, in keeping themselves free from the fetters of premature restrictions, and in manifesting a sure confidence in the future growth of their infant Institution. Corporate interests, commercial advantages they assuredly appreciated and sought after; but from the earliest period of their labours, to their credit and merit be it recorded, they recognized the grave public interests involved in their undertaking, and also the sacred trust that would be incidentally placed in their hands of promoting, advancing and diffusing the special knowledges connected with their useful, necessary and honourable calling.

In swaddling clothes, as a private Society, from 1841 to 1843, it was in the last-named year invested with the protective mantle of a Royal Charter, and since that period its existence and utility have been deservedly recognized by the Legislature in the important Acts of 1852 and 1868. But its restless craving for improvement is not yet satisfied, and a new "Pharmacy Bill" has made its appearance in Parliament, destined in time, it is to be hoped, to be transformed into an Act, which, like its predecessors, has for its aim the improvement of the professional education, and thence of the social status of the alumni of your popular and flourishing Society.

To the more restless and indefatigable of your members, the progress thus made in the development of your Institution may seem to have been too slow; but, I would ask, what is half a century in the career of a new public body? and, again, what in so comparatively brief a period have you not already accomplished?

Present State.—Reverting to your Calendar for full information as to your present condition, I find the record of continued and strenuous efforts crowned with marked, I would almost say with improbable success. To meet the growing exigencies of your educational work, your home, with its manifold adaptations, has been gradually expanded, and is now again being expanded, not only in a vertical, but in a lateral direction. The old technical laboratories, once large enough for the former classes of students, are now relegated to other uses, whilst much larger and more commodious rooms, fitted with improved and more abundant apparatus, have been provided; and, again, besides the separate accommodation thus set free for advanced pupils and other individual workers, each Professor and Lecturer has now his ample and suitably-furnished laboratory department. The various Collections, Chemical, Botanical and Pharmaceutical, the last-named being unique of its kind, are separately and suitably disposed, and so arranged as to be available for the lectures, or for practical instruction, or for private study, whilst a methodized Materia Medica collection is open, not only to your own school, but to medical students proper on the recommendation of their respective teachers. The Library, of ample extent, and in special directions of great excellence, is, under most liberal and yet safe rules, accessible to students from so early an hour as 9 a.m. until so late an hour as 10 p.m.; nor is this all, for it is, with certain exceptions, a lending library, even to members of the Society residing in the provinces. Lastly, I must not omit here to record the fact that the North British Branch of your Society established in Edinburgh has, not long since, been improved in its accommodation, and has met with continued success.

To all these apparently adequate provisions for sound and good scientific and practical teaching, I must add the ample supply of incentives to continuous effort on the part of your students in the

form of Prizes and other rewards for distinctive merit of various degrees.

Finally, let me note, that from the earliest stage of your existence, a Benevolent Fund has been created for the kindly purpose of assisting your less fortunate brethren or their bereaved and destitute families.

Action of the Society.—I pass on now to note that all this inanimate machinery, built up, however, under the direction of living and enthusiastic minds, has had, and continues to have, a life-like energy and movement imparted to it by a succession of well known and often famous Professors, Lecturers and Students ; its work has been tested by your Examiners, and the action of your entire educational system has been regulated by an evidently wise and sympathetic Council.

It would ill become me, so much a stranger to your affairs, to appraise the merit of any one of the many personal agencies which have been, or which are now engaged in your particular educational field ; but I must be allowed to offer my opinion that you have already gathered in a goodly harvest.

I speak not alone of the stimulus you may have given by your highest distinctions to original or otherwise valuable and elaborate research ; but I would say, as a member of my own profession, and as one of the body politic of this great country, it is no idle boast to proclaim that of the 14,000 individuals whose names are inscribed on your Register, about half, *i.e.* 7000, have passed either your Major or your Minor examinations.

Now this observation leads me naturally to turn to consider the special function which we are called upon to witness and participate in to-day ; I mean the award of honours to those who have just been tested in their respective departments of study, and have distinguished themselves by special merit as to their scientific knowledge or their technical skill.

I need hardly say that I desire to offer the successful candidates my sincere congratulations, to which I am sure I may add those of the Council, the Professors and the Lecturers, on having earned these hard-won distinctions. I may remind them that the receipt of such honours assuredly involves future responsibilities, not to be lightly set aside, or carelessly neglected. All prize winners are marked men, and their future career does not pass by unobserved. Early rewards received at the hands of an honoured public institution, are not only a recompense for past exertions, but should be regarded as pledging their recipients to future efforts for the maintenance of the reputation not only of the individual, but of the Society under whose training they have been earned. Nor, rightly considered, should those, who have only relatively failed in a competition for a necessarily limited number of prizes, be held exempt from the same obligation ; for even in regard to them it is impossible to overate the value of their methodical training and their individual efforts to succeed, nor the general beneficial effect of the race which they have run against others just a little more successful in their scientific and technical contest.

Future Progress.—I now turn to the future,—for to an Institution like this a future is of necessity in store, and it will be laden with good or evil, according as its living agencies may shape its onward course.

It is not for me to intrude my opinions on those debateable questions which involve the commercial interests of the members of your Society ;—such, for example, as relate to the competition between co-operative trade associations and private establishments,—to the necessity which exists in the former case for attaching definite personal responsibility in regard to the purity of drugs, the accuracy of dispensing and the sale of dangerous poisons,—and, again, to the question of the desirability of the State obtaining a source of income from the sale of patented medicines.

But I may be allowed to express, as the representative of the General Medical Council, the sympathy of that Body towards every endeavour and every practical suggestion which may be made by this Society with a view of improving the British Pharmacopœia, the responsibility for framing and publishing which is by law vested in that Council. Hence comes a direct and continuous encouragement to your legitimate aims of advancing pharmacology as a science, and of promoting pharmacy as an art.

The immediate object of your Society is, as I understand it, to afford the means of a perfect education, general, scientific and technical to all your future Members and Associates—so that each and all may attain to a high state of culture, knowledge and efficiency. Your past history shows that you will not halt in your efforts, but will even yet improve in your methods and in your results.

To this end, your future students, many of whom, unhappily, are outside the sphere of your influence and guidance, and must often be imperfectly informed as to the fittest course for them to pursue in regard to their education, should seek early in their career some friendly and trustworthy advice. It might not be beyond the scope of the duty of your Society itself to circulate very widely a brief pamphlet, containing advice especially intended for those who are still in the apprenticeship stage. It should be strongly insisted upon that a good preliminary general education is absolutely necessary to all who aspire to be really accomplished pharmacists and to be worthy Members or Associates of your Body. It is of the

greatest moment, moreover, that the general education of which I have spoken should really be in fact, as in name, *Preliminary*; and therefore the needful examination tests in it should be passed *before* the systematic scientific training is commenced; whilst this, again, should, if possible, precede the special technical work. It must, of course, be granted, that this last recommendation cannot always be followed; but, if not, at least the scientific habit and scientific mode of thought should be invariably inculcated, even by the practical teacher, as the ever leading and essential guides by which to interpret and illuminate the simplest technical procedure. In this way the humblest task is elevated; manual dexterity and mental improvement advance together; and every process thus watched, and every result thus accomplished, will yield the reward of intellectual satisfaction and will excite the pardonable emotions of pride and triumph which spring from the dutiful and successful performance of the humblest work. Finally, I would urge in the most positive manner, that not only socially, but professionally, the greatest probability of real success in life will fall to those who have had the most liberal, as well as the best scientific and technical education.

On the most interesting but perplexing questions relating to *Examinations* I am not now prepared to enter at any length. That examinations cannot be abandoned is clear; that there are evils connected with them is obvious; and hence the conclusion is evident that it is the business of examining bodies and examiners to investigate the charges against them and to aim at their improvement. That some examinations may be too feeble, and others too severe, must also be true; for examining boards will differ as to what is the proper mean. A due admixture of the systematic and the practical form of examinations is absolutely needful, for theoretical questions cannot well be answered *vivâ voce*, and all technical work must be directly tested. The more of the latter the better, and yet not at the expense of the former. Longer time may be required; but the results will be more satisfactory and more fair. Besides this, "cram" will sink to a minimum, and be even beneficial, for it must take the practical form of doing actual work. I am a strong advocate for the introduction of what are called "outside" or "coadjutor" examiners; but this only in co-operation with the institutional teachers, who best know the aims and the extent of the preceding education. Of course, this remark applies specially to bodies which both teach and examine, and thus it is surely applicable to your own Society. In regard to purely examining bodies, no particular training institution or school should be over-represented on the examining board. In all cases two examiners at least should work together at every part of every subject. As to the subjects which are to be examined in at each time, they are often too many or are too severely represented; either practice is a serious source of overstrain, as well as of illegitimate and unhealthy "cram." If the subjects at each examination were fewer, if schedules in certain otherwise enormous subjects were adopted, and if the examinations were more prolonged and practical, "tutors," not "crammers," would take and keep the field.

I cannot close this address without offering your Society my warmest congratulations on the establishment of its Research Laboratory. It will undoubtedly prove useful, nay, indispensable, to many an advanced student, who, whether trained within your own walls or elsewhere, may aspire to lend his aid in endeavouring to promote real knowledge in ever so simple yet unexplored corner of chemical or pharmaceutical research. But what I would specially refer to is the encouragement which you now offer to the higher and more elaborate and more difficult prosecution of inquiries in what is understood as pure science, undertaken for science's sake. Pharmaceutical chemistry, and through it pharmacology, have before them, in the domains of nature, both inorganic and organic, never-ending problems, concerning the constitution and action of remedial substances, which nothing but the highest and most prolonged investigation can pretend to solve. In such inquiries the physiologist must take his share; but in your own sphere of investigation, they invite you to reap a rich reward, not only in an increased reputation with the outside scientific world, but in the realization of a corporate pride arising from your own augmented influence, in the increased reliance of the public upon your opinion and guidance, and, I doubt not, in that progressive success which all must desire for you.

Permit me to thank you for the opportunity and the honour of thus being able to address you and to assure you that I have not meant to flatter, but to encourage. And so I conclude with congratulating all, your President and Council, your Professors and Lecturers, your Members and Associates, and lastly your Pupils both past and present, on your actually accomplished successes; and I venture to prophesy for you that future prosperity which is the invariable reward of lofty aims followed by harmonious and vigorous acts.

NOTES ON ESSENTIAL OILS FROM MESSRS. SCHIMMEL AND CO.'S OCTOBER REPORT.

The following notes on various essential oils are taken from the October Report of Messrs. Schimmel and Co., of Leipzig:—

ANGELICA ROOT OIL (Japanese).—Information has been received from Mr. Murai, Tokio, that the *Angelica anomala*, Lall. s. *Angelica japonica*, A. Gray (Jap. "*Biyakushi*"), referred to particularly in the last report (*Pharm. Journ.*, April 6, p. 803), is cultivated in Japan on account of its roots. Mr. Murai's experience as to the oil contents of the root corresponds with that of Messrs. Schimmel. From roots cultivated at the botanical station in Tokio he obtained 0·074 per cent. and from seed 0·67 per cent. The oil was of a greenish

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colour and had a very strong odour resembling that of musk. In winter a solid white mass separated.

ARNICA FLOWERS OIL.—The specific gravity of this oil is given as 0 906 at 15° C. The oil is said to be a liquid and not of a butter-like consistence, which form it assumes only upon undergoing a cooling.

BAY OIL.—A sample of oil distilled from leaves imported direct from St. Thomas has been examined by Dr. Mittmann, in Breslau, who found eugenol to be the principal constituent; the methyl ether of eugenol was also present in small quantity as well as pinene and probably dipentene and diterpene. The specific gravity at 15° C. was 0·970. The oil dissolved clear only in ether, petroleum ether, carbon bisulphide and chloroform, while with alcohol and glacial acetic acid it gave a strong turbidity. In preparing "bay rum" from bay oil, therefore, the solution may prove turbid and require to be filtered or treated with magnesia.

BETEL OIL.—The isomer of eugenol mentioned in the last report (*Pharm. Journ.*, April 6, p. 803) as occurring in the oil of betel leaves has now been definitely named "betelphenol." The other important constituent of the oil is a sesquiterpene identical with that already detected in the oils of cubebs, savin, patchouli and camphor.

CASSIA OIL.—Several pages in the present report are devoted to the controversy that has arisen upon the statements made by Messrs. Schimmel respecting the adulteration of certain brands of cassia oil (*Pharm. Journ.*, April 20, p. 842). It will be remembered that samples of oil that had been certified by the proprietor of a "Medical Hall" in Hongkong as being pure and completely volatile, were reported by Messrs. Schimmel to contain an ingredient that they had identified as petroleum, and to leave on redistillation 25 per cent. of a solid residue that had been recognized as pitch resin. It appears that this report has drawn from the person responsible for the certificates, a Mr. Niedhardt, an assertion that Messrs. Schimmel's chemists have mistaken for petroleum a light hydrocarbon that is a natural constituent of genuine cassia oil, and that the resin was a natural product of alteration in the oil, which occurs to the extent of 30 or 40 per cent., even in an oil only a year old. In respect to the first point Messrs. Schimmel protest against it being supposed that their chemists, who are engaged every day in dealing with essential oils, would confound with petroleum a terpene. Moreover, they state that after purification the substance in question has a specific gravity of 0·795 at 20° C., being considerably lower than that of any known terpene; also that it boils between 160° and 265° C., and is indifferent towards sulphuric acid. As to the solid residue it is pertinently asked how an oil that contained so much resin, even if that were a natural constituent, could be certified as "perfectly volatile." But the prevailing scarcity of pure cassia oil has had the effect of bringing into the market some old stocks, and afforded Messrs. Schimmel an opportunity of examining samples from seventy cases said to have been warehoused in Amsterdam for from nine to seventy years. These, whether distilled in a retort over an open fire or rectified by steam, gave as a distillate a clear oil, and the residuum, which varied from 5·5 to 8 per cent., was in every case liquid and did not solidify. Cassia oil distilled in Messrs. Schimmel's establishment from cassia chips, when redistilled at the end of four months, yielded 5·4 per cent. of liquid residue, and an oil of the same age, from cassia buds, gave 4·4 per cent. of liquid residue. As the result of this experience the opinion is expressed that a good merchantable cassia oil should answer to the following characters: (1) It should have at 15° C. a specific gravity of 1·050 to 1·070. (2) Upon distilling about 90 per cent. of pure cassia oil should pass over, and the residue, which may amount to 6 or 7 per cent., and in no case to more than 10 per cent., should not become solid and assume a resinous appearance on cooling, but should remain semi-liquid at least. Experiment has shown that no practical value as a test attaches to the relative solubility of cassia oil in alcohol when it contains an admixture of resin and petroleum.

It is thought that the determination of the value of mercantile cassia oils on a scientific basis will have to depend upon the quantity of cinnamic aldehyd contained in them. The percentage of cinnamic aldehyd obtained at present are as follows:—

a. Pure Oils.

1.	Home distillation from cassia chips	88·9
2.	Home distillation from cassia buds	80·4
3.	Brand "Ayong," age 60 to 80 years	76·0
4.	Brand "Ayong," age 24 years	72·9
5.	Brand "Ayong," age 20 years	89·4
6.	Brand "Hop Lee," very old	76·6
7.	Brand "Tac Foong," very old	78·4

b. Adulterated Oils.

8.	Brand "Yan Loong," 1st lot	58·0
9.	Brand "Yan Loong," 2nd lot	63·2
10.	Brand "Cheong Loong," 1st lot	58·7
11.	Brand "Cheong Loong," 2nd lot	52·9
12.	Brand "Cheong Loong," 3rd lot	57·8
13.	Brand "Luen Tai"	47·1

The amount of cinnamic aldehyd in these oils was found by determining the percentage of non-aldehydes after separating the aldehyd by means of sodium bisulphite, but some skill is necessary to obtain exact results. The results show that the amount of cinnamic aldehyd is smaller in proportion to the increase in adulteration. Further investigation will be required, but at present it may be stated that a cassia oil that contains less than 70 per cent. of cinnamic aldehyd may be considered adulterated, and that probably an oil containing less than 75 per cent. should be looked upon with suspicion. For instance, a sample of oil, brand "Ayong," age 9 years, which yielded 79 per cent. of cinnamic aldehyd, left a liquid residue from which 10 per cent. of fixed oil was separated, so that before it was adulterated this oil would have shown nearly 90 per cent. of aldehyd.

The principal non-aldehyd constituent of cassia oil has been ascertained by repeated fractionation to be the acetic ether of cinnamyl, $C_2H_3O_2 \cdot C_9H_9$, the portion boiling between 135° and 145° C. (at 11 mm. atmospheric pressure) consisting entirely of that ether. The cinnamic alcohol, obtained by saponification, crystallizes from ether in white solid crystals, boils at 137° C. (11 m.m. pressure), and has a "somewhat hyacinth odour." The presence of the acetic ether of phenylpropyl is also probable. Terpenes of the constitution $C_{10}H_{16}$ are not present, but probably sesquiterpenes and polyterpenes are. Free cinnamic acid, formed by oxidation of cinnamic aldehyd in contact with air, was found both in old oils and those freshly distilled, but always in small proportion.

CITRONELLE OIL.—Two years since Messrs. Schimmel called attention to the adulteration of citronelle oil with petroleum and they now state that since that time the adulteration has gone on with increasing audacity. Fortunately a ready test for the adulteration is available in the behaviour of the oil towards alcohol. Experiment with specially distilled oil has shown that the solubility of the citronelle containing only a small quantity of petroleum is pretty large, but that upon the addition of more petroleum it diminishes rapidly. The test recommended is that one part of the oil should give a clear solution with ten parts of 80 per cent. alcohol, when shaken vigorously. In the presence of 10 per cent. of petroleum the mixture becomes milky. An addition of a fixed oil is still more perceptible, as little as 1 or 2 per cent. being recognizable, but the mixture becomes turbid rather than milky. The specific gravity of the oil should not be below 0·895 at 15° C.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, OCTOBER 5, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

THE Council meeting of last Wednesday was attended by nineteen members, the absentees on that occasion being Messrs. GREENISH and MARTIN. Two persons were then elected associates of the Society, and fifteen as apprentices or students, while several others were respectively restored to their former status in the Society or to the Register of Chemists and Druggists. The report of the Finance Committee showed that the receipts since the last meeting of the Council consisted mainly of examination fees, which are in the ordinary course paid at this period of the year. In addition there was a sum of £25 10*s.* 6*d.*, representing five penalties and costs that had been paid as the result of prosecutions for infringements of the Pharmacy Act. The payments were chiefly for the usual monthly and quarterly accounts, and as a payment would probably in the course of the ensuing month become due to the contractors for the new premises in course of erection that amount was also included in the estimate presented. In view of the payments that would be requisite in that respect between now and Christmas the Committee recommended that power should be given for the sale of stock standing to the credit of the General Fund to the amount of £3000, and the motion of the President to that effect was carried unanimously.

The report of the Benevolent Fund Committee recommended the payment of five grants of ten pounds each, and one of five pounds, to six applicants for relief whose cases had been considered and found most deserving. Four other applications had not been entertained, and one had been deferred for further inquiry. The death of four annuitants since the last election in December, 1888, has reduced the total number of annuitants to forty-eight, and since the financial position of the Fund at the end of the present year appears likely to be much the same as it was last year, the Committee recommended that four others should be elected next December, in view of which the names of four applicants whose cases have been approved are to be added to the list of candidates unsuccessful at the last election. There will therefore be altogether eight candidates for annuities at the next election on the 5th December. From the remarks of the Vice-President on this subject it may be inferred that the Committee considers that by the election of four more annuitants the extreme limit of its capability will have been reached under existing conditions and that the possibility of electing a larger number would be dependent upon a considerable increase in the amount of subscriptions to the Fund. Moreover, when it is remembered that so large a proportion as about one-half of the annuities are being paid out of current subscriptions, the need for caution will be obvious to avoid any possible risk of reducing the power to afford casual relief of an adequate nature in cases of emergency. This difficulty has already been experienced in past years, and where a grant of £10 or even £20 would have been appropriate, it has only been possible to give £5. The disappointment expressed by Mr. HAMPSON that six annuitants could not be elected will doubtless be shared by many others who take an interest in this useful part of the Society's work, but they, as well as he, must bow to the decision of the Committee in this respect, but with the hope that means may be devised for considerably augmenting the amount of annual subscriptions to the Fund. At the present time the annual subscriptions to the Benevolent Fund amount to about £1500, an amount which if contributed equally by every person on the register would represent little more than two shillings from each individual. Actually the number of subscribers is very much more limited, the individual subscriptions ranging from 2*s.* 6*d.* to ten guineas. The possibility of augmenting the Fund is therefore very considerable. If the number of subscribers could be so far increased that the average contribution of registered persons were only five shillings each, the capability of the Fund for granting annuities would be doubled. That is a result which must still be hoped for as being attainable in the future, though at present the approximation to it is but slender.

Another point of considerable interest in regard to the administration of the Benevolent Fund was again raised by Mr. HAMPSON in the course of the discussion. The necessity that exists under the present system of canvassing for votes is one which he regards as painful and humiliating to the candidates, besides being a trouble and expense to them that might well be rendered unnecessary. It is true that candidates are sometimes assisted in this work by their friends or benevolent persons who take an interest in their application, but even in such instances the other applicants who are not thus assisted are placed at some disadvantage. There seems to have been a very general recognition of these objections to the system under which the administration of the Bene-

volent Fund is now administered by those members of the Council who took part in the discussion. Some were even inclined to think that the action of the Committee which selects candidates for election might be extended so far as to supersede the election as now carried out, and there can be little doubt that the particular objection raised by Mr. HAMPSON could thus be removed. With a sufficiently large body, such as the Council of twenty-one members, to elect annuitants on the Benevolent Fund on behalf of the subscribers there ought not to be any ground for want of confidence that this duty would not be properly performed. Such a course would entirely do away with the hardship that candidates for annuities should be put to the trouble and expense of making a personal canvass, while the present system of selecting candidates for election only mitigates that hardship by making the contest less severe than if there were a large number of candidates for election. Still it must not be forgotten that the adoption of such a method of election might have a prejudicial influence upon the subscriptions to the Fund. It cannot be doubted that subscribers to charitable institutions frequently take a special interest in the elections, and in exercising their influence to secure votes in favour of particular candidates. As the President pointed out, a little of the commercial element has to be brought in to keep up the funds of charitable institutions like the Benevolent Fund, and there is a danger that if the opportunity for direct personal influence of subscribers upon the elections were to be removed by transferring the voting power from them to a committee the subscriptions might be materially reduced in amount. However, the question of the desirability of a change in the mode of election of annuitants to the Benevolent Fund has now been so definitely mooted, that it will no doubt receive further consideration from the subscribers and those specially interested in the welfare of the Institution. It may also be added that the plan of election by a Committee acting on behalf of the subscribers is already in operation in two of the largest and most successful charities in this country, and that it has been found to work satisfactorily in every way.

Among other matters that came before the Council was the appointment of Mr. WILLIAM HEYWOOD as local secretary for Bury in Lancashire in place of Mr. BOWKER, who has resigned in consequence of going into the medical profession. An application to allow a certificate of the Academy at Aix to be received in lieu of the Preliminary examination was agreed to on the motion of the President. The report of the General Purposes Committee gave particulars of some recent cases of prosecution for infringement of the Pharmacy Acts and recommended proceedings in another case. Two letters from Mr. BRAXTON HICKS, the Coroner, were discussed in committee, and the recommendation to prosecute an unregistered assistant of a registered chemist and druggist gave rise to an amendment moved by Mr. SCHACHT and seconded by Mr. EVANS, that this portion of the report should be struck out. This amendment was put to the vote and negatived and the original motion for the adoption of the report was then carried.

The Council of the Leicester and Leicestershire Chemists' Association announces that arrangements have been made for Mr. H. Evans to conduct a Practical Pharmaceutical Chemistry Class on Wednesday evenings during the Winter session, commencing October 15, in the Laboratory of the Wyggeston Technical School. In addition a Materia Medica Class will be held at St. George's Chambers, Leicester, on Tuesday evenings, by Mr. W. James, Pharmaceutical Chemist, and an Elementary Chemistry Class on Friday evenings, by Mr. J. Ward. No fee will be charged to Associates of the Association for attending the Materia Medica and Elementary Chemistry Classes and only a small one for the Practical Pharmaceutical Chemistry Class. Further particulars may be obtained from Mr. J. H. Shepherd, Honorary Secretary, St. George's Chambers. The Second Annual Prize Distribution and Ball is fixed for Thursday, October 10, on which occasion the prizes awarded to successful students in the previous session will be distributed by the President of the Association, Mr. J. G. F. Richardson.

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From the Syllabus of the School of Pharmacy in connection with the Sheffield Pharmaceutical and Chemical Society we learn that there will be a course of lectures and demonstrations on Botany on Monday evenings, by Mr. J. Humphrey; a course of lectures and demonstrations on Materia Medica, on Tuesday evenings, by Mr. Robert Watts; a course of instruction in Analytical Chemistry, on Thursday evenings, by Mr. J. H. Worrall; and a course of lectures on Chemistry and Physics, on Friday evenings, by Mr. S. T. Rhoden. In addition a course of twelve lectures and demonstrations on Pharmacy and Practical Pharmacy, by Mr. G. Ellinor and Mr. G. A. Grierson, will be given on such evenings as may be found convenient. The classes will meet in the rooms of the Society, New Surrey Street, and the session will last from Monday, October 14, to Friday, April 27. Further information may be obtained from the Honorary Secretary, Mr. C. O. Morrison, 137, West Street, Sheffield.

* * *

The first meeting of the new session of the Chemists' Assistants' Association will be held on Thursday evening next, at nine o'clock, at the rooms, 103, Great Russell Street, when the Inaugural Address will be delivered by the President, Mr. T. A. Ellwood.

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A meeting of the Dundee Chemists' Assistants and Apprentices' Association will be held on Wednesday evening next, when an address will be delivered by the President, Mr. John Forsyth.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, October 2, 1889.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Evans, Gostling, Hampson, Harrison, Hills, Leigh, Martindale, Newsholme, Richardson, Robbins, Schacht, Southall and Watt.

The minutes of the August meeting were read and confirmed.

Elections.

ASSOCIATE IN BUSINESS.

David Thomas, of Talgarth, having passed the Minor examination, being in business on his own account, and having tendered his subscription for the current year, was elected an "Associate in Business" of the Society.

ASSOCIATE.

Frederick Alfred Roper, of Plymouth, having passed the Minor examination, and tendered his subscription for the current year, was elected an "Associate" of the Society.

APPRENTICES OR STUDENTS.

The following having passed the Preliminary examination, and tendered their subscriptions for the current year, were elected "Apprentices or Students" of the Society:—

Albrecht, Paul Frederick .....London.
Beattie, James Brown .....Fife.
Braden, Frank.....Nottingham.
Branford, William .....Farnham.
Branson, Preston James .....Plymton.
Carter, Charles .....Newlyn.
Dickinson, Charles.....Llandudno.
Dodd, Henry Vincent.....Slough.
Geary, Frederic Charles .....Coalville.
Harris, George William.....Nottingham.
Jones, William Miall .....Aberyswith.
Pearson, George Edward .....Northallerton.
Strickland, Ernest Frank .....Cardiff.
Underwood, George.....Whitby.
Woodward, James Henry .....Spalding.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

David Burgess Cowper, 9, Lynedoch Street, Greenock.
William Glover, 262, High Street, West Bromwich.
Charles Frederic Groom, 44, Great Charles Street, Birmingham.
Ralph Dearlove Walker, 20, Alice Street, Leicester.

Reports of Committees.

FINANCE.

The report of this Committee recommended the payment of the usual current account, and also of a sum not exceeding £1000 to the contractors for the new buildings, on the certificate of the architect. It also recommended that a power of attorney be obtained for the sale of stock standing to the credit of the General Fund not exceeding £3000.

The President, in moving the adoption of the report and recommendations, said there was nothing calling for special attention in the receipts, which mainly arose from examination fees at this time of the year. He might mention, however, that in one case in which legal proceedings had been taken, five penalties, amounting to £25 and 10*s.* 6*d.* costs, had been paid, and he understood that the offender had discontinued his illegal proceedings. The payments were mainly for monthly and quarterly salaries, and the amount to be paid to the contractors would probably be due in the course of the month, and it was therefore included in the estimate. Having regard to what would probably be required on this account between now and Christmas, the Council recommended that power be taken to sell out £3000, which would be done as required, at the discretion of the Treasurer.

The motion was carried unanimously.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (age 53) of a member from 1842 to 1850. Applicant has had three previous grants, the last of £5 in October, 1883. (Sussex.)

£5 to the widow (age 60) of a member from 1870 to 1880. Applicant has had four previous grants, the last in October, 1885. (Birmingham.)

£10 to the widow (age 33) of a chemist and druggist and subscriber to the Fund for four years, who died in March last, leaving her wholly unprovided for and in bad health. (Edinburgh.)

£10 to a registered chemist and druggist (age 64), who has failed in business, and cannot obtain employment. (Hants.)

£10 to a former associate from 1844 to 1848 (age 72). Applicant, who has had two previous grants, is very feeble, with failing sight and hearing. His family can only render him very slight assistance. (London.)

£10 to an associate and member from 1842 to present time (age 67). (Bristol.)

Four cases had not been entertained, and one had been deferred.

The Secretary had reported the death on September 25 of Mrs. Louisa Kennett, aged 71, who had been an annuitant since 1880.

The next Election of Annuitants.

A Financial Statement of the Fund had been submitted, showing that in October, 1888, there were forty-nine annuitants on the list, and that three were added at the December election, making the total fifty-two. Four of these had died during the year, leaving the number of annuitants now on the list at forty-eight. Four candidates were unsuccessful at the last election, and the Committee, after a careful examination of the cases of persons relieved during the year, had added four more names to the approved list. The Committee recommended that four annuitants be elected in December next, the election to take place on Thursday, December 5.

List of Candidates for an Annuity.

Brown, Eliza, Louth.
Copney, William, London.
Davis, Samuel Forbes, Southend.
Edwards, Hannah Cutting, London.
Mumbray, Henry George, Manchester.
Pitman, Emma, Westbury.
Spendelow, Mary E., Liverpool.
Suggate, Henry Ezra, London.

The Vice-President moved the adoption of the report. He said the Committee had carefully gone into the question, and come to the conclusion that at the end of the year the position of the Fund would be about the same as it was last year, and that therefore, while it would be safe to recommend the election of four annuitants in December, bringing up the number to fifty-two, it would not be prudent to advise a larger

number being elected. There were four remanets, who were unsuccessful last year, and after a very careful examination of the cases of persons relieved during the present year the Committee had selected four more candidates who appeared to be the most deserving.

The VICE-PRESIDENT, in committee, gave particulars of one of the rejected cases.

Mr. ATKINS said the Committee had very carefully considered whether it would be prudent to elect six annuitants, which it would have liked to do, but it could not see its way to do so. He wished again to press the claims of the Fund very earnestly on the attention of chemists. There were a large number of cases coming forward, and the Committee did its best to relieve distress, but after all it was obliged to make a selection of the most pressing and deserving cases.

Mr. HAMPSON was rather disappointed that six annuitants could not be elected, but bowed to the decision of the Committee. The only thing which troubled him was the very painful process which the candidates had to undergo. Here was one old woman of eighty-one, who had to enter into a contest with others, one of whom was fifty-nine, and to subject herself to all kinds of trouble and expense in order to obtain an annuity. It appeared to him that the process was a cruel one and absolutely unnecessary in the interests of the charity. He should be very glad if the Council at some future time should see its way to discontinue this method entirely, and by some other fair means distribute the charity without this ordeal, which was painful, unnecessary, and inhuman.

Mr. ROBBINS said there was no difference of opinion in the Committee as to the number which should be placed on the Fund, and it was not always a good thing to put too large a number on the list. Some time ago six annuitants were elected, and the result was that the action of the Committee in affording casual relief was crippled, and it was only able to grant £5 when it would willingly have given £10.

Mr. RICHARDSON asked if Mr. Hampson meant to imply that the action of the Committee was inhuman?

The PRESIDENT said Mr. Hampson objected to canvassing, and in that he believed they would all sympathize with him. He hoped the time would come when the Council would have twice as much money to dispose of, and the subscribers would have sufficient confidence in the Council to allow it to dispose of the funds. He was sorry to say, however, that in all charitable, and even in all religious matters, a little of the commercial element had to be brought in in order to keep up the income. It was a great pity, but the care with which the Committee selected the applicants to some extent diminished the evil; the contest was less trying than if there were a large number of candidates. He would remind the Council that there was much truth in what the Treasurer had said. Roughly speaking, half the annuities were paid out of the current subscriptions, and it was very important for the Committee to make an estimate, and decide how much should be available for annuities and how much for casual grants. Sometimes a grant of £10, £15, or £20 was of the utmost value, and if there were too many annuitants there would not be enough for casual grants. Much as he would like to put more annuitants on the list, he thought the way to do the greatest good to the greatest number of their poorer brethren was to adopt the recommendation of the Committee, so as to leave a fair amount for distribution in casual grants during the year.

Mr. RICHARDSON asked if he understood aright that the President hoped that at some future time their constituents would give the Committee the power of granting the annuities?

The PRESIDENT said yes; if they had more money.

Mr. RICHARDSON said that was a new idea altogether.

Several members expressed their dissent.

The PRESIDENT said this plan was followed in some charities.

Mr. RICHARDSON said he knew a case where it was done, and it lessened the subscriptions considerably.

Mr. HARRISON said it was suggested that this was an entirely new departure, but it was only an extension of the principle already adopted. There were many applicants for the annuities, and the Committee in its discretion selected those it thought the most deserving. Mr. Hampson now suggested, and the President supported, the idea that that principle should be carried a step farther, and that the Committee should not only make the first selection, but the final selection, and he must say he thought it would be a very good thing if this were adopted. According to the present practice six or eight names were issued to the general body of subscribers, many of whom knew nothing whatever about the cases, and it was very much a matter of haphazard who were selected. Sometimes one with a large number of friends and some means was able to make an elaborate canvass, and obtain an advantageous position on the poll, but it was certainly something like a hardship that persons who were in such a state of poverty should be asked to go to the expense, trouble and labour of making a personal canvass. He believed the Benevolent Fund was administered with such scrupulous care that the subscribers would have full confidence in leaving the final selection in the hands of the Council.

Mr. RICHARDSON said he did not give any opinion of his own; he simply asked the question whether that was the idea suggested. His idea was that the Fund should be administered for the benefit of those who were the recipients of it, and so as to obtain the largest amount of subscriptions possible, and he feared that if the voting power were taken away from the subscribers it would materially lessen the subscriptions.

Mr. EVANS agreed to a great extent with Mr. Richardson; he thought subscribers would take less interest if they were not allowed to vote, and possibly many would not subscribe at all. It occurred to him, however, that the Committee, in the exercise of the powers vested in it, might in one particular case which had been referred to have made a casual grant where the person was so old that she could not possibly require it for very long, and in fact, if she were elected she could hardly be expected to receive the annuity for the whole year. By giving her temporary relief the case might have been met.

The PRESIDENT remarked that the person referred to had had one grant in the course of the year, and it often happened that those who were unsuccessful in the election had their cases brought before the Committee and received grants.

Mr. ABRAHAM asked if the Committee had considered the advisability or possibility of prohibiting or checking the practice of canvassing. He feared that under the present system, not the most deserving, but the best off and those least in need were most likely to be successful; in fact he had known instances of such a character.

Mr. CROSS said there were two sides to this question, and in reply to the observations of Mr. Richardson he might remark that there already existed an association in London which recommended its supporters to withhold all subscriptions from any fund which was dispensed by elections and allowed of canvassing.

Mr. HAMPSON said it was only by ventilating this question that any good would be done. He felt strongly disposed last year to move a resolution on the subject, but he thought his purpose had been very well served by the progress of this movement in the Council. They all professed to be humane and anxious to give as much relief and happiness as possible to those who sought their help, but he was sure that no

kind hearted man, if he examined the next election as it took place, or obtained all the particulars he possibly could with regard to each case, and the means which had to be adopted to further the ends of the candidates, but would be ashamed to subject them to such a contest again. It was a most pitiful thing that the common sense of Englishmen, chemists or others, took such a long time to arrive at a decision on this point, which was sure to come in the end.

Mr. ATKINS said there was not the slightest doubt on the part of the Committee that the particular case referred to would be successful at the next election.

The PRESIDENT in putting the motion said the objection raised by Mr. Abraham had been mooted before, but it was inseparable from the present system, and that was just the reason why Mr. Hampson and others suggested that the system should be changed. It was not fair, however, to say that when an application was received from a candidate asking for votes that the candidate was spending the money involved in the canvass. There were benevolent men who out of their private pockets assisted the candidates with money for this purpose. Of course that was not a desirable thing to do.

Mr. HAMPSON said the result was that the persons without friends went to the wall.

The PRESIDENT said no doubt that was the drawback. Nothing short of a process of selection by a sufficiently large body, such as the Council of twenty-one members, would get rid of this objection, and he hoped the time would come when their subscribers would have sufficient confidence in the Council to entrust it with sufficient funds—and 5*s.* from every chemist would do it—to allow the Council to elect the annuitants without their having to go through this process, which he agreed with Mr. Hampson was a degrading one.

The motion was then put and carried unanimously, as was also a resolution for the election of four annuitants on December 5.

LOCAL SECRETARY.

On the motion of Mr. NEWSHOLME, seconded by Mr. ALLEN, Mr. William Heywood was appointed Local Secretary for Bury, Lancs.

CERTIFICATE IN LIEU OF PRELIMINARY EXAMINATION.

The PRESIDENT said an application had been received from a French gentleman that a certificate from a public examining body in France should be received in lieu of the Preliminary examination. The body in question was the Académie at Aix, in the south of France, and the examination was a most thorough one, far in excess of that which the Board of Examiners required. He therefore moved that the Board of Examiners be empowered to receive this certificate.

This was unanimously agreed to.

THE HANBURY MEDAL.

The PRESIDENT read a letter which the Secretary had received from Professor Planchon, expressing his great sense of the honour which had been conferred upon him by the award of the Hanbury Medal. The President added that Professor Planchon would be present that evening to receive the medal in person.

GENERAL PURPOSES COMMITTEE.

This report, which was taken in committee, included two letters from the Solicitor, giving particulars of cases which had been placed in his hands. One defendant had paid penalties and costs into court, and several cases were standing over for the collection of evidence.

The Committee recommended proceedings in another case of alleged infringement of the Act which had been placed before it.

Two letters from Mr. A. Braxton Hicks, Coroner for London, had been considered.

On resuming,

The PRESIDENT moved that the report and recommendations of the Committee be received and adopted.

Mr. SCHACHT moved as an amendment that the report be received and adopted, with the exception of the portion which recommended the prosecution of the unregistered assistant of a registered chemist and druggist.

Mr. EVANS seconded the amendment.

The amendment, on being put to the vote, was negatived, and the original motion was then carried.

EVENING MEETING IN LONDON.

Wednesday, October 2, 1889.

The inaugural meeting of the session took place on Wednesday, October 2, the chair being taken by the President, Mr. MICHAEL CARTEIGHE, at half-past eight o'clock, when the Hall was crowded to its utmost capacity.

In opening the proceedings the President said he regretted to announce that Professor Marshall, President of the Medical Council, had unfortunately been attacked with a severe cold and lost his voice, and he had just received a letter from him saying that he was unable to deliver the address. The address was in his possession, but unfortunately the meeting would be deprived of Professor Marshall's personal presence.

REPORT ON THE PRACTICAL CHEMISTRY CLASS.

Professor ATTFIELD being called upon to report on the class of Practical Chemistry, said there had been eighty-four students during last session, twenty of whom competed for the bronze medal at the end of March, the successful candidates obtaining 85 per cent. of the possible marks. Sixteen competed for the silver medal in July, and the successful competitor, who he was glad to say would be associated with him in the coming session as demonstrator, obtained 96 per cent. of the possible marks.

The successful competitors were—

[First Examination.]

Bronze Medal.....George Sydney Fuller.

Certificates of Honour... { Thomas Woodruff. / John Brooks Thornley.

[Second Examination.]

Silver Medal.....Harry Dixon Fuge.

Certificates of Honour... { John Brooks Thornley. / Richard Henry Norman. / George Sydney Fuller.

The questions set at these examinations will be found in the *Pharmaceutical Journal* for April 20, p. 854, and July 20, p. 49.

REPORT ON THE CLASS OF CHEMISTRY AND CHEMICAL PHYSICS.

Professor DUNSTAN next reported on the Chemistry and Chemical Physics Class. Last session, for the first time, he remarked, a change had been introduced into the mode of teaching. Formerly it had been the custom to deliver two courses of lectures, the first occupying five months and the second being a repetition of the same. During the last session the plan had been introduced of having one course divided into two parts, one ending in March and the other in July. This plan had worked extremely well, and anyone who knew the amount

of chemistry it was now necessary to teach a pharmaceutical student would realize the difficulty a professor was in when attempting to deal with the subject in five months. In a course of ten months both the professor and the students were placed in a much better position. This improved system had had the result—not unsatisfactory, but somewhat remarkable—that the same man had been able to get both the bronze and the silver medals, and in each case the first and second certificates of honour also fell to the same gentlemen, both of whom were Bell Scholars. All these gentlemen and also the one who took the third certificate in July, richly deserved the honours which had been awarded them. The examination was by no means an easy one, including as it did the three branches of chemistry, physical, inorganic and organic, and the successful candidates therefore might well be congratulated. The medals and certificates, however, were not to be regarded as ends in themselves, but should rather be regarded as incentives to future exertion. He should have been very glad if Mr. Thornley, the silver medallist, could have gone on with his work in the Research Laboratory, but unfortunately his health did not admit of this, his medical adviser having prescribed a lengthened residence in another country, and he was therefore going to Australia.

The successful competitors were—

[First Examination.]

Bronze Medal.....John Brooks Thornley.

Certificates of Honour... Harry Dixon Fuge. Equal. Alfred Latchmore. Richard Henry Norman.

[Second Examination.]

Silver Medal.....John Brooks Thornley.

Certificates of Honour... Harry Dixon Fuge. Richard Henry Norman. Lewis Ough.

The questions set at these examinations will be found in the *Pharmaceutical Journal* for April 13, p. 830, and July 20, p. 49.

Report on the Botany Class.

Professor Green, in reporting on the Botany Class, said that what had fallen from Professor Dunstan with regard to the new arrangements of the school would have come with equal force from himself, as the teaching of Botany had also been slightly altered. There had been two courses, independent of each other, though most of the students at the beginning announced their intention of attending both courses. It had been a subject of some anxiety, whether one course divided into two sections, elementary and advanced, should supersede the older plan, but so far experience had been in favour of the plan now adopted. Nearly all the students attended the whole course, and looking over the work done during the year, without going into indiscriminate eulogy, he might say that the work had been done in every way as well as could be expected. There had been men of different calibre, some very good, and others whose claim to consideration was founded on sheer hard work, rather than on brilliant talents, but taking the work as a whole he had every reason to congratulate himself and the school on the class of men who took advantage of it. The first division of the course, consisting mainly of anatomy and morphology, which could be carried on in the winter months, was examined upon at the end of March, when Mr. H. D. Fuge took the bronze medal, closely followed by Mr. Latchmore and Mr. Jones, the Redwood Scholar. The work was thoroughly good, and the Society might be congratulated on the results of establishing this scholarship. At the end of the session Mr. Fuge again took the chief honours, and he was glad to say that he was going to continue his studies, and to assist him as a demonstrator during the ensuing session. The special feature of the botanical work during the year had been the development of practical botany. Two years ago the Council enabled him to commence this department, and last year further facilities were afforded him, by means of which he established a microscopical class for practical botany, and he could speak in high terms of the work done by many of the students, one in particular, Mr. Albert Smith, though his name did not appear afterwards as a prizeman, was exceedingly good at this practical work. In conclusion he wished to mention in terms of high appreciation the assistance he had received from Mr. Edmund White, a former Bell Scholar, and while congratulating him very heartily on his new position at St. Thomas's Hospital, where he followed their old friend, Mr. Sidney Plowman, he could not help expressing his personal regret that by Mr. White's good fortune he should be deprived of the assistance of a very able colleague.

The successful competitors in the Botany Class were—

[First Examination.]

Bronze Medal .....Harry Dixon Fuge.

Certificates of Honour.. Alfred Latchmore. William Thomas Jones.

[Second Examination.]

Silver Medal.....Harry Dixon Fuge.

Certificates of Honour .. Lewis Ough. Alfred Latchmore. William Thomas Jones.

The questions set at these examinations will be found in the *Pharmaceutical Journal* for April 13, p. 831, and July 20, p. 49.

Report on the Herbarium Competition.

With regard to the herbarium prize, Professor Green reported that three collections had been sent in. The first, a very good one, including 531 specimens mounted with great care, and with an evident appreciation of the peculiarities distinguishing the different species and genera, and showing all that there was to show, so that he had no difficulty in ascertaining whether the collector had been successful in identifying them. The next one contained 337 specimens—a very good work, and the third, 467, but they were not quite so well mounted. With regard to the competition for this prize, he thought it was not very satisfactory to get only one herbarium sent in, as had frequently been the case, and possibly some clear understanding of the conditions of this competition might lead to better results in the future. Most candidates seemed to think it was no use competing unless they could send in a huge mass of specimens, but he would point out that that was not the idea, which would be really degrading the competitor to the level of a plant hunter. The real object was to show the competitor's knowledge and discrimination. He thought, therefore, it

would be a good plan if it were understood that quality, not quantity, was principally looked at. Mr. Horrell would have got the same prize if he had only sent in half the number of specimens, and he would suggest that the Council might in future limit the number of specimens, and that it should be well understood that the mode of displaying them so as to show that the competitor had actually worked upon them should be a criterion in future. He should also be inclined to give the preference to medicinal plants over others.

The successful competitors were—

Silver Medal ....Wm. Foskett E. Horrell.
Bronze Medal ....George James Monger.
Certificate of Honour ..... Alfred Wade Willmott.

Report on the Materia Medica Class.

Mr Holmes in reporting on the Materia Medica Class said that twelve candidates competed at the end of the winter course for the bronze medal, and the gentleman who had the good fortune to win it obtained the full number of marks possible. At the close of the summer season there were eight competitors, Mr. Wain, who obtained the silver medal, having done so simply by steady, persevering hard work, for he had had some powerful competitors, the next candidate being only three marks behind him.

The successful competitors were—

[First Examination.]

Bronze Medal.....Harry Dixon Fuge.

[Second Examination.]

Silver Medal.....Clement John Wain.

The questions set at these examinations will be found in the *Pharmaceutical Journal* for April 13, p. 830, and July 20, p. 49.

Report on the Pharmacy and Practical Pharmacy Class.

Mr. Ince next reported on the Pharmacy Class. He said there had been no alteration made in the arrangements of this course, there having been the usual winter and summer courses of the same duration as before; but in one respect there had been a great change, which he hoped would be permanent, namely, that nearly all the students had remained for the full course of ten months. It was obvious to all practical pharmacists that it was impossible for any man to get an intelligent notion of pharmacy in five months. The course had, however, been divided into two parts to meet the wishes of those who joined the class at the commencement of the summer season. He need not repeat what had been said by the other Professors, and would only add that both at the end of the first and second course the papers of the two first competitors stood out so distinctly from the others that there had been no difficulty whatever in deciding on their merits, though there was considerable difficulty in saying who should be first and who second. Both these gentlemen were Bell Scholars, and he might remark in conclusion that he was quite convinced now from practical experience, as he had been before on theoretical grounds, that a good liberal education was infinitely the best preparation for any technical study, pharmacy not excepted.

The successful competitors were—

[First Examination.]

Bronze Medal.....Harry Dixon Fuge.

[Second Examination.]

Silver Medal .....Richard Henry Norman.

The questions set at these examinations will be found in the *Pharmaceutical Journal* for April 13, p. 830, and July 20, p. 50.

The President then distributed the prizes and certificates to such of the successful competitors as were present.

Report on the Council Examination Prizes.

Mr. Bowen then reported on the Council Examination Prizes, for which eleven gentlemen competed, three of whom only gained sufficient marks to entitle them to a prize. At the same time he could not say that the work of the unsuccessful candidates was to be despised. It was very good work, but it was uneven. For instance, one gentleman who had very excellent marks for chemistry was faulty in botany and materia medica, thus reducing his average. He considered it a matter of great satisfaction that the Bell Scholars should come out so prominently in an open competition of this kind.

The President then handed the medals to the successful competitors as follows :—

I. PEREIRA MEDAL (SILVER); and Books of the value of £5 *presented by Mr. T. H. Hills.*

Harry Dixon Fuge.

II. PHARMACEUTICAL SOCIETY'S MEDAL (SILVER); and Books of the value of £3, *presented by Mr. T. H. Hills.*

Alfred Mander.

III. PHARMACEUTICAL SOCIETY'S MEDAL (BRONZE); and Books of the value of £2, *presented by Mr. T. H. Hills.*

Lewis Ough.

The questions set at this examination will be found in the *Pharmaceutical Journal* for July 27, p. 72.

Report on the Bell and Redwood Scholarships.

The President then explained the nature and origin of the Bell and Redwood Scholarships, and remarked on the satisfaction which it must be to all there that Professor Redwood was again able to be present at the awarding of the scholarship which had been founded in his honour.

Mr. Saul then gave his report on the examination which had been conducted by Mr. Tanner and himself for these scholarships. He said the competition was a decidedly good one, being satisfactory both in the number of candidates and the general quality of the papers. The number of candidates had only once been exceeded, and it would have been bracketted with the highest on record but for the sad accident which happened to one of the would-be competitors, Mr. E. G. Wilson, which resulted in his lamentable but heroic death, he having lost his life in the happily successful endeavour to rescue two children from drowning at Oxford. The candidates were distributed at all the chief examination centres throughout England, but it was worthy of notice with regret that Scotland should be so poorly represented. This year there had been none from that part of the United Kingdom, and during the past five years only two students had been

examined for these scholarships on the other side of the border. He thought that a nation so deservedly famous for its students ought to show a more practical appreciation of these useful, valuable and honourable scholarships. He then announced the result as appears below, and the President awarded the scholarships accordingly:—

The Jacob Bell Memorial Scholarships.

Charles Ernest Boucher
and
Harry William Kilby Pears,

The Redwood Scholarship.

Edward Birchall Sherlock.

The questions set at this examination will be found in the *Pharmaceutical Journal* for July 13, p. 30.

The Inaugural Sessional Address.

Professor Attfield was then asked by the President, in the absence of Professor Marshall, to read the inaugural address. The address is printed at the commencement of the present number of this Journal.

At the conclusion of the reading—

The Vice-President (Mr. Bottle) moved a vote of thanks to Professor Marshall for his extremely comprehensive address. The members of the Society thanked him as President of the Medical Council for the sympathy he had shown in their work, and for the sketch he had given of the rise, progress, and probable future of the Society. They would also desire to convey to him their sympathy with him in his present ailment, and to express the hope that he would soon be fully and permanently restored to health.

Dr. W. J. Russell, F.R.S. (President of the Chemical Society), in seconding the motion, said he had listened with very great interest to the address, which appeared to him exceedingly appropriate to the occasion. It was not for him as an outsider to say anything with regard to the history and prospects of the Society, but the subject of examinations, which was no doubt the burning question of the day, was one which Professor Marshall had studied very deeply, and his views upon it were of great importance. He thoroughly sympathized with all that he had said upon that subject.

The vote of thanks was carried by acclamation.

Presentation of the Hanbury Medal.

The President said the next business of the evening had little to do with the School of Pharmacy, except in the sense that Daniel Hanbury was one of the early students in that School, and that the Medal which he had the honour that evening of presenting was founded by a number of his friends, pharmaceutical, scientific and medical, to commemorate his memory. The desire to show sympathy for the work which Daniel Hanbury had done, not only for pharmacy and pharmacology, but for the whole profession of medicine, was so strong that it was found necessary to limit the amount of subscriptions, and in the result a very handsome sum was raised, and the Council of the Pharmaceutical Society was chosen as the executive body to carry out the provisions of the trust deed which was agreed upon. That deed, after reciting the merits and claims of Daniel Hanbury, provided that a gold medal of a certain value should be awarded biennially to the most distinguished man of any nation in materia medica in its widest sense. The conditions laid down were very special and definite, and in order to prevent any possibility of abuse in the adjudication it was decided that besides the President of the Pharmaceutical Society, the President of the British Pharmaceutical Conference, and a pharmaceutical chemist nominated by them, there should be associated the Presidents of the Chemical and of the Linnean Societies. Those gentlemen represented in the widest sense the corporate bodies dealing with the sort of work in which Mr. Hanbury was interested. He was glad to say that all but one of the adjudicators were present that evening. Mr. Carruthers, President of the Linnean Society, was unable to attend, but he had sent his homage and congratulations to the recipient of the medal. He had now simply to report that the award had this year been made to a distinguished Frenchman, Professor Gustave Planchon, of Paris, and if it was a great honour to Englishmen to be associated with this award, it was also a great compliment when the recipient, being a foreigner, came over to receive it in person. On only one occasion previously, when it was awarded to Mr. Howard, had the medal been personally presented. Professor Planchon was an eminent authority on the subject on which Daniel Hanbury worked so arduously and with so much satisfaction, so that he was sure if he could have been present he would have heartily concurred in the choice which had been made. The first medal was awarded to Professor Flückiger, Mr. Hanbury's colleague; the next to Professor Dragendorff; the third to Mr. Howard; the fourth to Professor Dymock; and now for the first time it fell to an eminent Frenchman. From being a pharmacist, with that liberal education which the French law required of all pursuing that calling, Professor Planchon had become not only a prominent man of science in his own country, but a great authority all over the world on this special subject of pharmacology. He was the successor and editor of Guibourt, who might be termed the Pereira of France, and he was therefore the Pereira, the Daniel Hanbury, the Guibourt of the world. And he might remark that this subject was a peculiar one, which did not present those immediate attractions that some other branches of experimental science did; but to those who did pursue the work as Professor Planchon had done, not only in editing Guibourt's works, but in original lines of his own, such as his treatise on the genus Strychnos, which was published in the Pharmaceutical Society's Journal, it no doubt had peculiar attractions, and was certainly of the greatest value. The original papers to which he had referred were so completely and perfectly worked out that they alone would have been sufficient to justify the award which had been made. But Professor Planchon had also done an immense amount of other work. He was interested in science in its pharmaceutical aspect throughout the whole of France, for he was director of the School of Pharmacy of Paris, which was a national institution and part of the University of France. In fact, in France, as in some other countries, pharmacy was recognized as a liberal profession, and the student had to attend the University in order to gain the knowledge requisite to become a pharmacien. In England they were a long way off that, pharmaceutical education being entirely voluntary, but it was remarkable that while Englishmen were

complaining of some of the difficulties in the way of obtaining a qualification, the restrictions in the neighbouring country were much more precise and severe. Besides being director of the École de Pharmacie, Professor Planchon was associated with the department of public instruction in France in all that appertained to the science of biology, and took part in the school examinations in that subject. Under the French system of national education, even school boys had an opportunity of obtaining at a comparatively early age a good knowledge of biology and general science. He had said enough to show the reasons which had actuated the adjudicators in awarding this medal, and in conclusion he would again remark on the great courtesy and courage which Professor Planchon had shown in braving the terrors of the English Channel, and coming there *in propria persona* to receive the medal which he had now the honour and privilege of presenting to him.

Professor PLANCHON, who spoke in French, replied as follows:—

Ladies and Gentlemen,—I regret that I am not able to tell you in your own language with what happiness I find myself in your midst in such circumstances. Nothing could gratify me more than the choice of your committee, composed of men whose independence and authority cannot be contested, while it is in itself a very precious consecration and great encouragement for the efforts that I have made for the advancement of materia medica. It is also a great satisfaction to see my name associated with the distinguished pharmacologists who have received the same medal: Flückiger, the worthy co-worker with Hanbury, with whom I have long been on terms of good friendship; Howard, so devoted to science, who with a charming kindness and courtesy supplied me with valuable materials for my 'Etudes sur les Quinquinas;' and Messrs. Dragendorff and Dymock, whom I have not the pleasure of knowing personally, but whose works on the chemistry of drugs and the Pharmacopœia of India I am called upon to consult daily. With these sentiments of natural pride is joined another that is more personal—a true satisfaction of heart induced by the name of the medal that I venture to receive. Daniel Hanbury was the ornament of your Society, which he has honoured by his science and by his character. He belongs to you entirely; but all the societies on the continent were glad to have him amongst them, and we in particular, the Société de Paris, considered him as one of ourselves. He had been the faithful friend and assiduous correspondent of Guibourt, who resembled him in the conscientiousness of his researches and his love of the good. Subsequently he kindly afforded to myself, in various ways, evidences of esteem and affection, and in Paris we regarded him with the most lively sympathy and listened with the most respectful interest to any communications that he made. His memory always lives among us, and lends, in the eyes of our Society, a great additional attraction to the prize given in his name. For these reasons I thank with all my heart the Committee which has awarded it to me, the Council of the Society which has accorded me so gracious a reception, and all present who have kindly taken part in it. To these thanks permit me to add the wishes and salutations of two institutions, whom it is my duty to associate in a part of my success of to-day; for if you have crowned the modest labours of the man of science you have also wished to honour the École de Pharmacie de Paris in the person of one of its Professors and its Director, as well as the Société de Pharmacie through its General Secretary.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.

SECOND DAY'S PROCEEDINGS.

Wednesday, September 11.

(*Continued from page* 256.)

On Wednesday morning the proceedings commenced with the reading of a paper entitled—

CHEMICAL OBSERVATIONS ON THE ROOT BARK OF EUONYMUS.

BY W. A. H. NAYLOR, F.I.C., F.C.S., AND E. M. CHAPLIN, F.C.S.

Mr. W. T. Wenzell appears to be the only chemist who has published the results of a systematic examination of the bark of the root of *Euonymus atropurpureus*. His monograph on this subject is to be found in the *American Journal of Pharmacy*, September, 1862. In initiating an inquiry into the proximate principles of this drug it seemed advisable that we should follow the plan marked out by Wenzell, carefully go through his experiments, and see to what extent we could confirm the results he obtained.

A. The bark was first treated with 95 per cent. alcohol, and the tincture thus obtained set aside for future examination.

B. The marc was then thoroughly exhausted with cold water. This solution was heated, in order to coagulate the albuminous matter present and afterwards filtered. The liquid thus freed from albumen was evaporated over a water-bath to the consistence of a thin syrup, when it was observed that a white deposit adhered to the bottom of the basin; this, after the liquid had been poured off, was found to consist of citrate of lime.

The decanted solution after suitable dilution with water was then precipitated with neutral acetate of lead, and the precipitate (α) thus formed was taken up in suspension with water and decomposed with sulphuretted hydrogen; the liquid after the sulphide had been filtered off proved to be composed of tartaric and malic acids. (β) The filtrate from the neutral acetate of lead precipitate was then treated with subacetate. From the precipitate thus produced, Wenzell states that after separating the inorganic salts present, he was able to obtain a small amount of a crystalline body of the nature of an organic acid which he termed euonic acid. The quantity, however, was insufficient for him to examine thoroughly as to its properties. Although we have very carefully followed his method of procedure we have not succeeded in detecting this body.

The filtrate from the subacetate of lead precipitate (β) was then freed from lead by sulphuretted hydrogen. After the sulphide of lead was filtered off the liquid was evaporated slowly down to a small bulk on the water-bath and then put in a warm place for spontaneous evaporation. A large crop of crystals soon formed. These crystals were drained on bibulous paper and taken up with water. The greater portion dissolved, leaving behind a white sediment consisting of lime and alumina.

These inorganic salts were filtered off and to the filtrate was added twice its own volume of strong alcohol. A flocculent precipitate was formed, and

after a few minutes on pouring the liquid off a small quantity of the organic crystals came out of solution and deposited on the sides of the vessel. The flocculent precipitate consisted of salts of potash. After the potash salts had been filtered off the solution was evaporated and the resulting crystalline deposit drained on bibulous paper as before. This process of purification was repeated until the crystals were practically colourless. Under the microscope they exhibited a needle-shaped form, and with the aid of the selenite plate could be seen to polarize beautifully. This body was distinctly sweet to the taste, and when quite dry was much less readily soluble in cold water; when once dissolved, however, it did not easily fall out of solution. It was very sparingly soluble in alcohol and ether. Hot water dissolved it freely, forming a neutral solution. Its aqueous solution was not precipitated by tannic acid. It melted at about 182° C., and it did not become red by contact with sulphuric acid. We would here draw attention to the fact that though the body we have just described was obtained by following Wenzell's plan exactly, still few of the reactions, beyond the solubilities, agree with those that he gives to the crystalline substance which he separated and pronounced to be asparagin.

The body we have isolated, and which may be provisionally called *atropurpurin*, differs from asparagin in the following particulars. Nitrogen does not enter into its composition. When boiled for an hour or more with a 2 per cent. solution of aqueous sulphuric acid it reduces Fehling's solution, indicating that it is of the nature of a glucoside. It has a fixed and well-defined melting point.

Further, we are unable to harmonize certain of Wenzell's statements of the behaviour of his crystalline substance with his inference that "there is no doubt of its identity with asparagin." The statements we refer to are these :—Solution of ammoniacal acetate of lead gives a voluminous white precipitate. On heating the crystals on platinum foil, they first fused. When treated with sulphate of potash in the cold combination was readily effected, with the evolution of ammonia.

C. In a tincture of the bark prepared with dilute alcohol, Wenzell found a neutral, uncrystallizable body, possessed of a bitter taste which he termed euonymin.

We are able to confirm his finding of such a principle.

For the purpose of this experiment we used alcohol of the sp. gr. 0·920. The tincture thus prepared was shaken up with chloroform and after separation was effected, the chloroformic layer was drawn off and evaporated down with the aid of very little warmth.

The residue was very bitter and had an acid reaction. This was then treated several times with warm ether; part dissolved (α) and (β) remained undissolved.

(α) On evaporation gave a yellow resin which had an acid reaction and produced an irritating sensation at the back of the throat to be afterwards described as acrid.

(β) The residue unacted upon by ether was taken up with alcohol and to this solution neutral acetate of lead was added. The precipitate formed was filtered off and the filtrate freed from lead by sulphuretted hydrogen. After removing the lead sulphide a slightly coloured liquid was obtained, which when evaporated left the euonymin as an exceedingly bitter residue.

It was quite soluble in water, forming a neutral solution; was insoluble in petroleum ether; did not crystallize; was precipitated both by subacetate of lead and by tannic acid. When dissolved in alcohol subacetate gave no precipitate.

Another method for obtaining euonymin is described by G. Romm (*Chem. Centr.*, 1885, 442-443). He extracts the bark with 70 per cent. alcohol, distils off the spirit, and concentrates the residue to a syrupy consistence on a water-bath. It is then diluted with water and filtered. This filtrate is precipitated by neutral acetate of lead; the precipitate is filtered off and sulphuretted hydrogen passed through the filtrate; the resulting precipitate of sulphide of lead is filtered off and the acid liquid neutralized with carbonate of magnesia and precipitated with tannic acid. The precipitate formed after being washed with water is exhausted with absolute alcohol. This alcoholic solution is next treated with excess of freshly prepared oxide of zinc and dried to a powder on the water-bath. The powder is extracted with absolute alcohol and the liquid filtered off. After ether has been added to separate out the glucose the solution is gently evaporated down, when he states that crystals of euonymin separate out. As he gives no properties or reactions of this body, whether it is acid or alkaline or neutral, or whether it has a bitter taste or not, we are unable at present to say if the product we obtained by this method is identical with Romm's euonymin.

D. A fresh portion of comminuted bark after treatment with boiling water was extracted with 65 per cent. alcohol. On the alcohol being distilled off a dark brown mass was left behind. When this was treated with petroleum ether part dissolved (α). (β) was the portion undissolved. (α) This portion soluble in petroleum ether was evaporated down to dryness, when a dark brown acrid residue remained. This was boiled for about an hour with a 5 per cent. solution of caustic potash in proof spirit. The spirit was then driven off and the aqueous portion left behind shaken up with ether.

Three layers separated out :—

(α 1) The top layer contained the portion soluble in ether.

(α 2) The middle layer was composed of rosy-red flocculent matter.

(α 3) The bottom layer contained the part soluble in water and was of a dark brown colour.

(α 1) The ethereal layer was then taken and evaporated, and the residue treated with alcohol, which dissolved it. A portion of the alcohol when drawn off and evaporated yielded a yellow resin free from bitterness, neutral in its reaction and tasteless. Potash salts were tested for and proved to be absent. The remainder of this alcoholic solution was allowed to stand for some hours. When again looked at a crop of colourless crystals had separated boldly out from the solution, in the form of long silky needles. They were insoluble in boiling water and also in diluted hydrochloric acid, but were soluble in ether and in a less degree in alcohol. When incinerated they left no ash, and when placed in contact with strong sulphuric acid were turned red. The melting point was found to be about 129° C. From the fact that we have not met with this crystalline body by the use of simple solvents, we are inclined to believe that it is to be regarded as a product rather than as an educt.

(α 3) To the aqueous layer hydrochloric acid was added to set free whatever fat and acid resins might be present. This separated mixture of free acids was taken up with ether, which, on evaporation, left a brown oily substance. When treated with proof spirit part dissolved (α 4), leaving the fat acids of the oil undissolved (α 5). These fat acids crystallized in fine needles assuming a fan-like arrangement.

The portion soluble in proof spirit (α 4) filtered through animal charcoal yielded on evaporation an acrid uncrystallizable principle to be again referred to.

(β) The part of the residue from the 65 per cent. alcohol extract, insoluble in petroleum ether, consisted of a dark brown resinous substance which dissolved completely in ether. It was possessed of a disagreeably bitter taste. When dissolved in alcohol it precipitated with neutral lead acetate (β 1). The filtrate after

getting rid of the excess of lead was evaporated and yielded a yellow uncrystallizable resin having a slightly acrid and bitter taste. (β 1) The lead precipitate was suspended in alcohol and decomposed with sulphuretted hydrogen; the liquid, after the separation of the sulphide of lead, gave on evaporation a yellow uncrystallizable resin, soluble in ether and insoluble in petroleum ether, having an acid reaction.

Viewing the results from the extraction with 65 per cent. alcohol in the clearer light of after experiments it is evident that the method adopted fails to effect a sharp separation of principles. The educts are more or less contaminated with their associated bitter and acrid principles respectively.

E. The marc, after the treatment with 65 per cent. alcohol, was further treated with 84 per cent. alcohol. After the alcohol had been distilled off the residue was treated with petroleum ether. This dissolved out a fixed oil, which after washing with 60 per cent. alcohol was quite bland to the taste and of a brownish-yellow colour. The portion insoluble in petroleum ether was identical with Dβ.

F. The marc was finally treated with ether, which gave a mixture of wax contaminated with oil. This was not further examined.

A. From the knowledge we have already gained and from subsequent experiments, we recommend the following method for isolating the proximate principles of euonymus dissolved in the tincture of 95 per cent. alcohol (*A*), alluded to at the commencement of the paper as having been set aside for future examination.

The residue obtained by the distillation of this tincture was exhausted with ether. The part which remained undissolved, and which Wenzell describes as a soft resin, when treated with water, completely dissolved, and presented the characters of "bitter extractive."

The portion taken up with ether was then evaporated to dryness, and to the residue was added just sufficient alcohol to effect its solution. It was allowed to stand for three days, when the larger portion of the neutral fixed oil it contained separated out. The oil, after washing with 60 per cent. alcohol, was practically tasteless.

The solution from which the oil originally separated, after evaporation to dryness, was treated with petroleum ether, when a portion dissolved (α). This (α) was evaporated to dryness, the oily residue was shaken up repeatedly with 60 per cent. alcohol.

The insoluble portion (α 1) consisted of neutral oil.

The soluble portion (α 2), after being evaporated, was treated with proof spirit, which dissolved out an oily principle (α 3). This was acid, and markedly acrid.

(α 4) The portion which did not dissolve in proof spirit crystallized readily from the mixture of stronger alcohol, and consisted of free fat acid or acids, a condition in which they exist naturally in the oil.

β. The portion insoluble in petroleum ether. This was treated with 60 per cent. alcohol. That which passed into solution (β1) consisted of Wenzell's golden yellow resin, uncrystallizable, having an acid reaction associated with a pronouncedly bitter principle. The removal of the latter was effected by repeated digestions with warm water, and the filtration of the decanted liquors when cold. The filtrate on evaporation left a light yellow residue, which after treatment with ether was practically colourless. It was intensely bitter, neutral, not crystalline, and was precipitated by tannic acid when not added in excess, and by basic acetate of lead. In all these respects it agrees with Wenzell's neutral body euonymin. Dissolved in water without the intervention of an acid it reduced Fehling's solution.

(β2) The portion of (β) insoluble in 60 per cent. alcohol was a brownish resin, hard and pulverizable, which after repeated washing with water was not perceptibly bitter. This corresponds with the resin insoluble in petroleum ether, from the 65 per cent. extract by alcohol (Dβ.)

We have searched for an oleoresin, but have failed to find one. We may also add the observation that an aqueous extract reduces Fehling's solution.

To summarize the results of our examination of the root bark of euonymus, we find the following organic principles:—Citric, Tartaric and Malic Acids, Atropurpurin? Euonymin (Wenzell), Neutral Fixed Oil, Crystalline Free Fatty Acid or Acids, Acrid Principle, Yellow Resin, Brown Resin, Bitter Extractive and Wax.

Our analysis differs from Wenzell's, in that we find atropurpurin in place of asparagin, bitter extractive in place of soft resin, free fatty acid in place of crystalline resin, brown resin soluble instead of insoluble in ether, and in addition an acrid principle.

The PRESIDENT said the Conference was much indebted to the author for this paper. There was nothing much more unsatisfactory than the preparations of euonymus.

Mr. GROVES asked if the euonymin of commerce was made from the root bark, as he understood it was made from the twigs, and if so, what was the reason for examining the root bark? Also he should like to know if the examination identified with any certainty the really active principles. What was the purgative property due to—the active principle or the fatty acids? Lastly, he asked if the crystalline body like asparagin had any action on the body if taken internally?

Mr. MARTINDALE said there was a substance which was described as a glucoside. It might be the same as Mr. Naylor spoke of, but it was not identical with asparagin.

Mr. NAYLOR, in reply to Mr. Groves's question, said the root bark was used partly because Mr. Wenzell had employed it in his analysis; secondly, because so far as he knew, the root bark was principally used in pharmacy. The only difference between the root bark and the twig in point of composition was, that the root bark contained much less of the poisonous principle that had been isolated by Meyer and Romm, which was a glucosidal body analogous to digitalin. With reference to the glucosidal principle which had been isolated by Mr. Chaplin and himself, he had not experimented with it on himself, or on anyone else, beyond tasting it. It had a slightly sweetish taste like populin. It gave no colour reaction with sulphuric acid. He was unable to say what was the active principle in euonymin or the euonymus bark of commerce. This paper was preliminary to one of a more pharmaceutical character to follow.

The PRESIDENT was glad to learn that Mr. Naylor purposed taking further action in the matter, and no doubt at some future meeting the Conference would hear further from him about it.

The next paper read was on—

MEDICAL AND CHEMICAL MISCONCEPTIONS ABOUT LITHIA.

BY LOUIS SIEBOLD.

For many years it has been an established article of faith with the medical profession to regard lithium compounds as powerful agents for preventing the deposition of uric acid in the tissues, or for dissolving and removing such deposits when already formed. These salts have been generally credited with being greatly superior for these purposes to the corresponding potassium salts; and they therefore enjoy a correspondingly greater reputation as remedies in chronic gout, calculus, etc. They owe their place in the materia medica originally to the observation that, as

compared with potash or soda, a smaller amount of lithia suffices to form a soluble salt with uric acid, and that this salt is more readily soluble in water than the corresponding potassium and sodium salts. From a chemical point of view, the relatively greater power of lithia to dissolve uric acid or—what practically comes to the same thing—its greater antacid or neutralizing power, presents itself as a matter of course, owing to the low atomic weight of lithium. It follows from the atomic weights of lithium and potassium that lithium carbonate will go nearly twice as far in this respect as potassium carbonate, or, to put it more exactly, that 74 parts of the former salt possess the same acid-saturating power, and are likely to dissolve as much uric acid as 138 parts of potassium carbonate. This is a natural conclusion apparent to every chemist; and if the medicinal fame of lithium salts went no further than appears warranted by this conclusion, I should not now trouble you with any observations on this subject. But that fame extends further, and the faith that many medical practitioners, and chemists along with them, have in the superior virtue of lithia amounts to a belief that its superiority is far greater than is indicated by the ratio of molecular weights. Were this not so it could have hardly come to pass that so much preference is given to the not so harmless and much more expensive lithium preparations. Nor is this faith in the superior efficacy of the latter confined to the carbonate, which is a direct antacid, and to the citrate, which though a neutral salt becomes converted into carbonate within the organism, and thus acts as an indirect antacid. It is extended also to a number of mineral waters containing lithia, generally mere traces of it, notwithstanding the fact that what there is of lithium in these waters generally occurs in them as chloride or as sulphate, salts which neither directly nor indirectly act as alkalies and possess no solvent action on uric acid. This seems quite irrational, and the question arises whether this fame, so far as it exceeds the reasonable chemical conclusions alluded to, really rests on a solid foundation, or whether it has no such foundation, but is based on misconceptions. Experiments which I conducted a few years ago, and which were then left unfinished, strongly inclined me to the latter view; and a further investigation of this subject carried out quite recently confirms me in this opinion. It is not my intention to trouble this meeting with a description of the numerous experiments made, though I shall be glad to give any information I may be asked for in the discussion. I shall simply give, in the briefest form, the conclusions I have arrived at from these experiments. They are as follows:—

(1) The relative solvent action of solutions of lithium, sodium, and potassium carbonates on a given weight of uric acid, under equal conditions of dilution and temperature, is strictly proportional to the ratio of the molecular weights of these solvents. (The determinations were made at 37° C., and the proportion of water to uric acid was not much greater than that occurring in urine.)

(2) Equivalent proportions of the three solvents named dissolve equal quantities of uric acid under equal conditions of dilution and temperature. (Experiments conducted on the same lines as in 1.)

(3) Crystals of uric acid deposited from urine show the same behaviour towards the solvents named as the pure uric acid used in 1 and 2.

(4) Equal weights of a urinary sediment consisting of acid urates, are dissolved by quantities of the three solvents named proportional to their molecular weights.

(5) Lithium chloride and lithium sulphate exercise no solvent action on uric acid and acid urates.

(6) Natural mineral waters containing lithium chloride have no solvent action on uric acid beyond that exercised by basic constituents simultaneously present, and by the water.

(7) The degree of alkalinity of urine produced by the internal administration of medicinal doses of lithium citrate is not greater than that produced by equivalent doses of potassium citrate. It is greater than that produced by equal doses of the corresponding potassium salts, but only so in proportion to the molecular weights. (All these experiments were conducted under strictly equal conditions of diet. The alkalinity was determined in the urine of twenty-four hours.)

To the foregoing conclusions I may add that lithium salts are known to be more toxic than potassium salts, and hence less suitable for prolonged administration. Altogether, the superiority of lithium salts as remedies in calculus, gout, etc., appears to me much overrated.

The PRESIDENT said the Conference was fortunate enough to have one or two gentlemen belonging to the medical profession present who possibly might throw some light on the question from a medical point of view. From the chemical point of view Mr. Siebold had certainly raised some queries which would indicate that lithia waters had no advantages over some other waters, and had probably some disadvantages.

Mr. SIDNEY PLOWMAN said he agreed in great measure with what Mr. Siebold had said. At the same time some allowance should be made for believing in tradition with regard to the therapeutic value of medicines. If one examined the pharmacist's Bible, the Pharmacopœia, and went through its contents, all would agree that it would be impossible for a medical student or practitioner to test rationally all the statements and traditional beliefs he has had to listen to from the lecture platform concerning the drugs therein contained. The Pharmaceutical Conference was doing splendid work when it induced such investigators as Mr. Siebold to come forward and show the fallacies of tradition, even with regard to one series of drugs, viz., the salts of lithia, and if other workers would come forward in the same way a great many of these traditional errors might be done away with, and they might get some exactitude in the science of medicine, which, though it had been said to be an exact science, was in fact the most inexact of all. He must say this, however, that in spite of tests and experiments and so on, it must always be remembered that the human body was not an enlarged test-tube, and, though these experiments might be very exact, yet the result of experience must always be taken into account.

Mr. PROCTOR asked whether a lithia water did not become famous before the fact of lithia being present was known. His impression was the fame came first, and the lithia was discovered afterwards.

Mr. SIEBOLD said he agreed with nearly everything Mr. Plowman had said. Still, the experiments he quoted were not altogether test-tube experiments, but were to some extent conducted on different lines. For instance, where he dealt with the alkalinity produced in urine by the internal administration of certain alkaline remedies, and showed that no greater effect was produced by lithium salt than by potassium salts, except in so far as the difference in the molecular weight would account for it, that was not really a test-tube experiment. But in a general way it was perfectly true that it was not always safe to draw conclusions from laboratory experiments as to what went on within the human organism. It was certain, however, that the therapeutic application of lithia for complaints such as calculus was based on its power to dissolve or render soluble uric acid, and what he was anxious to show was that it exercised this power simply in a chemical way as an alkali. Whatever view might be taken of the complicated processes going on within the organism, they could not arrive at the conclusion that certain salts could neutralize acids in any other way than in the manner which they had all learnt to understand as chemists. They could also

feel sure that infinitesimal quantities of any alkaline salt could not neutralize or render soluble more than infinitesimal quantities of acid, and it was really little else than superstition to believe that mineral waters containing a mere trace of lithium chloride should possess special powers in this respect. He quite agreed with Mr. Proctor that some of these waters had a reputation as medicinal agents for a variety of purposes before lithia rose to fame; but it was not until after that fame had commenced that they came into special favour as remedies for calculus, gravel and similar complaints. Some of these mineral waters did not contain the lithia they were said to contain, while others in which minute quantities did occur contained it in a form in which it had no solvent action on uric acid. In his opinion it was quite time that this matter should be looked at from a more rational point of view.

The next paper read was on—

Arsenic in Glycerine.

BY LOUIS SIEBOLD.

Attention has been called by Jahns in the *Chemiker Zeitung* (1888, 293), and subsequently by Vulpius in the *Apotheker Zeitung* (April 10, 1889), to the frequent occurrence of arsenic in glycerine. More recently R. A. Cripps, in a letter to the *Pharmaceutical Journal*, has pointed out that this contamination is not confined to glycerine of German manufacture, but occurs also in glycerine made in this country. These statements, and the absence of any information respecting the quantity of this objectionable impurity, induced me to submit a large number of samples of both English and Continental manufacture to a careful qualitative and quantitative analysis. My experiments, however, were not extended to low qualities of commercial glycerine, commonly used for technical purposes, but were confined to colourless and odourless samples sold for toilet and pharmaceutical purposes. The majority of the samples tested proved to contain arsenious acid varying in proportion from 1 part in 4000 parts to 1 part in 6000 parts; a few samples somewhat exceeded this proportion, while about 10 per cent. of the samples contained smaller proportions than 1 in 6000. The samples which were found free from arsenic nearly all represented, as far as I could ascertain, the product of one process of manufacture, viz., the steam distillation process, and this product is the very kind of glycerine which, I believe, is universally used by pharmacists in this country in the dispensing of prescriptions.

The process I adopted for the estimation of the arsenic consists in the conversion of the latter into arseniuretted hydrogen in a Marsh's apparatus, and the passing of the gas through a solution of silver nitrate. From the weight of the silver precipitate thus obtained the proportion of arsenic is readily calculated.

As a very ready and delicate means of detecting this impurity in glycerin Vulpius recommends the mode of testing first suggested by Gutzeit, and recently reported upon in detail by Flückiger (*Archiv der Pharmacie*, ccxxvii., p. 1). I agree with Vulpius as to the extreme suitability of this test for the purpose in question, but would recommend a much smaller proportion of acid as more conducive to success. I find an acid even weaker than that suggested by Flückiger to give the best results, and invariably employ a mixture of 1 volume of pure hydrochloric acid of 1·16 sp. gr. with 7 volumes of water, or in other words an acid containing about 4 per cent. of HCl gas. The following is a very safe and successful way of applying the test:—

Place a mixture of 5 c.c. of the dilute hydrochloric acid and 15 to 20 drops of the glycerine to be tested in a very long, narrow test-tube or cylinder, together with about 1 gram of metallic zinc perfectly free from arsenic. Before adding the zinc, place 1 drop of saturated solution of mercuric chloride, by means of a thin glass rod, in the centre of a small white paper filter and allow it to dry up by gently warming the paper over a flame. As soon as the zinc is added to the mixture of acid and glycerine, turn the paper over the mouth of the tube, and allow the latter to stand in an upright position. In the presence of $\frac{1}{100}$ of a milligram or more of arsenious acid in 1 gram of glycerine a distinct yellow stain will be produced on the under surface of the paper within a quarter of an hour, while with quantities of $\frac{1}{50}$ of a milligram and more this result is attained within a few minutes. Exceedingly small traces, such as $\frac{1}{200}$ to $\frac{1}{500}$ of a milligram of arsenious acid in one gram of glycerine may take from half an hour to one hour to produce a visible stain, but such minute traces may, I think, be disregarded. For all practical purposes I consider that the sample of glycerine under examination may be passed as pure if a distinct yellow stain fails to show within a quarter of an hour. In the presence of more arsenic than the proportions named the stain passes from yellow through orange to brown. In the place of mercuric chloride Vulpius used a saturated solution of silver nitrate which Flückiger has shown to give still more delicate indications, showing the presence of as little as $\frac{1}{1000}$ of a milligram of arsenic. But the test with mercuric chloride is amply delicate enough and has the marked advantage of not being interfered with by light or by the organic matter of the paper, and of being much less affected by minute traces of sulphuretted hydrogen. The absence of sulphur compounds in the glycerine as well as in the reagents can, of course, be demonstrated by repeating the experiment with a piece of lead paper, which is much more readily affected by sulphuretted hydrogen than the mercury paper. If the lead paper remains unstained after ten minutes exposure, or if it should only show a very faint or doubtful stain, it may be taken for granted that there is no sulphur present sufficient to stain the mercuric paper in the test for arsenic. Should, however, the lead paper give a decided indication of sulphur the latter may be rendered harmless in the test for arsenic by adding to the mixture of glycerine and acid, previous to the introduction of the zinc, a drop of weak iodine solution, or just enough to produce a visible coloration, as recommended by me many years ago in connection with the testing of wall-papers.

The drying up of the drop of mercuric chloride solution on the filter paper, instead of using the paper wet, seems to me to increase the delicacy and distinctness of the test, and renders unnecessary the introduction of a layer of dry filtering paper between the mouth of the tube and the test-paper, as recommended by Flückiger.

Arsenic in glycerin is considered to emanate from the sulphuric acid used in the manufacture of the latter; and I have little doubt that this is the main, if not the only source. A few days ago it occurred to me that this impurity might possibly also emanate, partly at least, from the glass of the bottles in which the glycerine is kept. It will be within the recollection of members of this Conference that years ago I traced the presence of lead in liquor ammoniæ acetatis to the solvent action of this liquid on the lead of the glass. What suggested to me a similar action in the present case was the well-known and very powerful solvent action of glycerine on arsenious acid, and the observation during my recent experiments that samples of a certain brand of glycerine which had been kept in bottles for a long time contained arsenic, while this impurity was absent from samples of the same brand drawn from tins. This difference may have been purely accidental, but it certainly renders it

desirable to study the action, if any, of pure glycerine on bottles of various kinds of glass; and this I am at present engaged in investigating. Up to the present my experiments in this direction have given negative results; but as they have only extended over a few days they do not as yet admit of any conclusion. With reference to the bottled glycerine in which I found arsenic, while a sample of the same make from a tin contained none, I may add that this glycerine was contained in bottles in the glass of which I had no difficulty in demonstrating the presence of arsenic. It is well known that certain kinds of glass used extensively for chemical apparatus contain arsenious acid; and according to recent observations the proportion of the latter in such glass occasionally amounts to as much as 0·1 to 0·4 per cent. I shall refer to this subject again as soon as my experiments now in progress are completed.

The PRESIDENT said this matter was a very important one. Glycerine was so largely consumed for medicinal purposes and was handled so freely by the public that if arsenic was present in the best or ordinary specimens used for household and medicinal purposes it ought to be known. At the same time it was necessary to be very careful not to create a scare among the public on this subject. They should approach the subject with open minds, recognizing the fact that arsenic was to be found in glycerine, and the question then arose where did it come from? Was it from an imperfection in its manufacture, arising from the sulphuric acid used in the process, from the glass in which it was stored, or from the tin which was put on the inside of the iron vessels in which it was largely packed, or from the solder put round the packages? It would be necessary to be very careful in examining the origin of these arsenical contaminations. He was very glad that some perfectly pure glycerine was to be found in the trade, and he should like to ask Mr. Siebold if arsenic were present as a defect in the manufacture, what he would suggest for its removal. The question was very important, both from a chemical point of view, and also from that of Medical Officers of Health.

Mr. A. H. ALLEN having listened with great interest to this paper congratulated Mr. Siebold on having found a test which seemed so simple and satisfactory. He had been listening all through the paper with the feeling that the results might be vitiated by the presence of sulphur compounds, and was glad at last to find it pointed out how easy it was to avoid their influence. Personally, when he had been troubled in that sort of way he had used a drop of permanganate instead of iodine, but he was inclined to think the iodine was equally good, and perhaps more elegant. The sulphur compounds might have three sources, the acid, the zinc, and the glycerine itself. Glycerine was of a very variable character; there were various qualities in the market, and on that account it was very likely that there was that distinction drawn by Mr. Siebold, who said he was able to trace the pure kinds of glycerine to one source, or perhaps it would have been better to have said to one process of manufacture. First of all there was the method of decomposition of fats by superheated steam, and with or without the addition of lime. In that case you got fatty acids which might be sometimes not so good for soap-making as the manufacturers desired, but the process yielded first-rate glycerine, which only required to be redistilled and concentrated to be extremely pure. In that case the glycerine had no chance of being contaminated by arsenic from any acid, because none was used in the manufacture. There might be some used to neutralize the lime subsequently, but that was after the glycerine was distilled over, and where it was obtained by such means it was likely to be pure. On the other hand a large quantity was made under very different circumstances, and from different materials—soap leys. These were now concentrated and distilled for the sake of the glycerine, and the largest works in England were those in Lancashire. This glycerine was chiefly employed for the manufacture of dynamite. Messrs. Nobel used several tons of glycerine a day to make nitroglycerine, and this being so it would be seen there might be a large quantity of arsenic pass off in that way, but they insisted on a certain known quality of glycerine for this purpose, and would resent any appreciable quantity of arsenic being present. Otherwise there would be arsenical hydrochloric acid used for neutralizing the soap leys, and those sort of things, in the production of glycerine. The glycerine was tested rigidly for certain impurities which were dangerous in the manufacture of nitroglycerine. Amongst the tests used was a nitrate of silver test, which would be likely to detect any arsenic existing in the distilled glycerine; and he did not think distillation would remove any arsenious acid previously existing in the glycerine. Mr. Siebold had suggested various sources of arsenic, and the President others, such as the solder of the tins. He did not think this was very probable; and as to the arsenic in glass, at Castleford, which was a glass-making town, they used more than a ton of arsenic a week, but he always had the idea that the greater part of that went into the air and poisoned the inhabitants, and not into the bottles. At any rate it was rather a novelty to hear that ordinary glass contained so large a proportion as 0·4 per cent. of arsenic, and he should like to know whether that was the proportion of material used in making the glass, or what remained after the glass had been heated to a white heat. Mr. Siebold had shown the way to detect arsenic in glass, but he was not aware of any published series of analyses showing such large amounts of arsenic in glass, and could hardly think that glass was the source of the arsenic found in certain specimens of glycerine, because, as Mr. Siebold said, the glycerine which he had traced to one process of manufacture was free from arsenic, although kept in bottles. There were other ways by which arsenic could get into glycerine. It was mentioned in connection with a late popular heroine that glycerine was found containing arsenic, and although that might have been introduced purposely, it was a curious matter in connection with this paper that arsenic should occur accidentally in connection with glycerine, and it gave rise to a train of thought which would naturally occur to everyone.

Dr. THRESH said he had listened to Mr. Allen's remarks with great interest, and they would all recognize the great importance of the subject. To medical men it was of great importance to have pointed out all the possible sources by which their patients might receive into the system traces of poisons like arsenic and lead. He had seen numbers of cases of lead poisoning in which the medical attendants had been utterly baffled in tracing the source of the lead. He remembered distinctly two cases, a father and son, in which the physicians were perfectly certain they were suffering from arsenical poisoning. Though they had seen similar cases traced to wall papers, in this case they could not trace it to anything. It might possibly have been that they had been taking some mixture containing glycerine which also contained arsenic. At any rate, if he had known at that time that such considerable quantities of arsenic might have been found in a drug like glycerine, his attention would have been directed to that point. The importance of the paper from a toxicological point of view could not be over estimated, but he did not think it was desirable to dwell at any length on that point. He should agree with Mr. Allen that it was due to the process of manufacture rather than to anything else.

Glycerine distilled with superheated steam was very unlikely to show any trace of arsenic. It was probably found in specimens prepared by other processes in which chemicals well known to contain arsenic were used.

The PRESIDENT said it was desirable to avoid bringing into the discussion the question of arsenic which might be present in raw crude glycerine. Those present cared nothing about what was used for manufacturing dynamite, whether it contained arsenic to the extent of one part in 1000 or 2000; they were more concerned with the presence of arsenic in minute quantities in glycerine used for medicinal purposes.

Mr. A. H. MASON said with regard to the possibility of the arsenic being derived from glass bottles if he understood correctly arsenic was only used in the manufacture of white flint glass. Ordinary bottles were not made with arsenic.

Mr. CONROY said most of them would be very much relieved by the last remarks made by Mr. Siebold, viz., that he found the class of glycerine used medicinally to be free from arsenic. He further understood, and this was at variance with the remarks of Mr. Allen, that Mr. Siebold was able to trace the source of the contaminated glycerine. It was implied in what Mr. Allen said that Mr. Siebold was able to trace the source of the glycerine which was free from arsenic, and that was a most important point which he should like Mr. Siebold to further elucidate in his reply.

Mr. SIDNEY PLOWMAN agreed that the Conference should be very careful to avoid anything like a scare in connection with the presence of arsenic in glycerine, but when it was found that it existed to a considerable extent—one in 4000 or one in 6000, and in some cases to a larger extent still—they were bound to admit that that was a serious quantity, and they must not shut their eyes to the fact, but if possible find out the source of it, and prevent it occurring. He remembered some time ago Mr. Fletcher reading a paper on the presence of arsenic in solution in chloride of iron, and a considerable discussion arose as to whether the whole of the arsenic came over as arseniuretted hydrogen, and reduced the nitrate of silver. He kept the suspected solution together with the reagents in a generating bottle for five or ten minutes and certainly got very fair results. He wished to ask Mr. Siebold what length of time he kept the suspected solution in contact with the zinc and hydrochloric acid in his quantitative experiments, and whether he considered nearly all the arsenicum came off as arseniuretted hydrogen. If not whether he could give any idea of the allowance to be made for the arsenicum remaining in the generating bottle.

Mr. BENGER asked if it was not possible that slight contaminations arose from the soldering liquor used. He knew by some practical experience in the manufacture of tins that the men were very careless in the use of that liquid, which consisted of zinc dissolved in common hydrochloric acid. They brushed it very freely along the joint and then ran their iron over it. Of course the quantity which got inside the tin would be very small, but it might give a trace of arsenic in some cases.

Mr. PROCTOR thought it was quite clear that the quantity of arsenic spoken of by Mr. Siebold could only get into the glycerine in the manufacturing process by which it was produced. These theories of the arsenic being contained in the tin or the soldering solution or glass were all outside the question of the presence of arsenic in so large a proportion as one in 4000; it was quite inconceivable that glass should yield so much as that to the contents of the bottle. They might satisfy themselves that the arsenic which was present in such quantities as to be a serious matter in pharmacy did not exist in those glycerines which pharmacists generally used. Mr. Siebold had already stated this, and it was simply to be borne in mind as a caution to use those qualities only for medicinal purposes which were prepared for that purpose, and could be relied upon not to contain this large proportion of arsenic. The proportion alluded to of 1 in 4000 or 1 in 6000 would make a teaspoonful of glycerine equal to 1½ or 3 drops of Fowler's solution for a dose, which was a very serious matter, but was a condition which he hoped and believed did not exist in the ordinary use of glycerine by pharmacists. It was well to have the caution that glycerine prepared from soap lees ought to be entirely excluded from pharmacy; he hoped it was so in general, and would be so entirely in future.

Mr. DOTT did not desire to say one word in depreciation of the valuable paper they had heard, but it must be borne in mind that all processes for determining traces of substances, with the exception perhaps of spectrum analysis, were to be received with a certain amount of caution. Mistakes had arisen with regard to selenium, and perhaps other elements which were supposed to be arsenic. All processes which indicated very slight traces were to be received with caution.

Mr. SIEBOLD said that he wished, in the first place, to correct an erroneous impression which some of the gentlemen present seemed to have received (from his remarks) to the effect that he had found all the glycerine from one particular firm of manufacturers to be free from arsenic. What he really said or meant to say was that nearly all the samples he found to be quite free from arsenic were traceable to one particular process of manufacture. He entirely concurred in the statement of one of the speakers that the process of distillation, if carefully conducted, would leave behind any arsenic emanating from the materials used in the manufacture of glycerine, and would yield a product entirely free from that contamination.

Mr. ALLEN said that was not exactly what he said. He said that if it were prepared by steam distillation originally it would never have any arsenic in it. He was rather under the impression that the arsenic would go over with the glycerine if it were once in it.

Mr. SIEBOLD said he quite agreed with Mr. Allen that there would be no arsenic in glycerine obtained by the steam distillation process; and he was further of opinion that any glycerine containing arsenic could be freed from it by such distillation. But there was no necessity for pharmacists to resort to any process of purification, as he had shown that there was no difficulty whatever in obtaining a supply of glycerine free from even the smallest traces of arsenic, and that the very kind of glycerine generally used in the dispensing of prescriptions was of that high degree of purity. As to the source of the arsenic, he was afraid he had been misunderstood by some of the speakers, who seemed to think that he regarded the glass of the bottles as the most likely source of contamination. This was not the case; he believed the sulphuric acid used in the manufacture of the glycerine to be the main if not the only source, but he thought it possible that some arsenic might also be dissolved from the glass bottles. His experiments, as far as they went at present, had not established this supposition, but they required to be carried on further in order to definitely settle this point. The occurrence of arsenic in glass used for bottles and chemical apparatus was no new observation, attention having been drawn to it by W. Fresenius in the *Zeitschrift für analytische Chemie* six years ago. It was well known that arsenious acid is often used in the manufacture of glass, as a decolorizing agent, and nowadays it was more generally and more abundantly present in glass than formerly, either from a more copious addition of arsenious acid, or from the use of strongly arseniferous materials. The proportion of 0·1 to 0·4 per cent., which

he had mentioned, was found in a number of determinations by J. Marshall and C. S. Potts, whose report on this subject would be found extracted in the current volume of the 'Year-Book of Pharmacy.' He could not tell how the proportion of arsenic found in glass compared with the quantity introduced in the making of it. He had repeatedly convinced himself of the presence of arsenic in German and Bohemian glass apparatus, and had also found it in some French and German glass bottles. If glass thus contaminated were finely powdered, intimately mixed with potassium cyanide and soda, and then heated in a suitable combustion tube, a distinct arsenical mirror would be obtained. As to the determination of arsenic in glycerine by passing it in the form of arseniuretted hydrogen through a solution of silver nitrate, he found that from three to four hours were amply sufficient to complete the process. The current of hydrogen ought to be a slow and steady one all through. He believed this process to be the most rapid and convenient for estimating minute traces of arsenic occurring as an impurity in pharmaceutical preparations, and to be sufficiently accurate for such purposes. He found that the qualitative test he had described at full length for the detection of arsenic in glycerine could also be turned to account for the purpose of approximate qualitative estimations, by performing the test simultaneously with samples of pure glycerine to which varicus known quantities of arsenious acid had been added, and comparing the results; but great care had to be taken in such a case to see that all other conditions were strictly equal. As to the question of arsenic being dissolved by glycerine from the tin or solder, he did not regard this as a likely mode of contamination, since he had found certain samples of glycerine kept in tin to be quite free from arsenic. He had also heated pure glycerine in tin bottles by the heat of a water bath for twenty-four hours, and found it to be still quite free from arsenic. To Mr. Dott's question he would reply that he had not solely relied in his experiments on the test described, but had also carefully verified the results by Marsh's test, but he could assure the meeting that the test he had particularly recommended was as trustworthy as it was convenient and sensitive, and it seemed to him to deserve to be strongly recommended to the general attention of pharmacists.

Mr. N. H. MARTIN asked if Mr. Siebold satisfied himself that all the reagents he used were chemically pure, because reagents sold as pure for analysis very frequently contained traces of arsenic or some other impurity.

The PRESIDENT said this was a very important point.

Mr. SIEBOLD said he ought really to have mentioned in the course of his paper that it was necessary in performing this test to precede it by a blank experiment, in order to make sure of the purity of the zinc and hydrochloric acid employed. If no stain was produced in such an experiment within a quarter of an hour, the reagents might be considered as free from arsenic.

(*To be continued.*)

Obituary.

Notice has been received of the death of the following:—

On the 24th of September, Mr. Thomas Hepburn Sclater, Chemist and Druggist, Kirkwall, Orkney. Aged 51 years.

On the 26th of September, Mr. Samuel Wylde, Chemist and Druggist, Walton, near Liverpool. Aged 44 years.

On the 28th of September, Mr. George Samuel Hankinson, Chemist and Druggist, Grange-over-Sands, Lancashire. Aged 58 years.

Parliamentary and Law Proceedings.

POISONING BY CARBOLIC ACID.

On Wednesday, October 2, Dr. George Danford Thomas held an inquest at the Paddington Coroner's Court relative to the death of Bridget Lyons, aged 52 years, lately residing at Lisson Grove, whose death took place from carbolic acid poisoning.

The evidence showed that the deceased, the wife of a labourer, had been addicted very much to excessive drinking, her favourite drink being rum. On the previous Saturday she got the worse for drink, and after having her tea she lay down to sleep. About 8 o'clock the same night her daughter returned home and found her lying on the floor, breathing very heavily and in an insensible condition, her mouth being charred. It was then found that she had drunk a quantity of carbolic acid from a bottle which was kept in the house, unlabelled, for disinfecting purposes, and it was the opinion of her relatives that she had in her drunken condition mistaken the carbolic acid for rum, she being in the habit of bringing rum home in bottles similar to the one in which the poison was kept. She was removed to St. Mary's Hospital, where she died some half-hour after admission.

The jury returned a verdict of "Death from misadventure."—*Times.*

BOOKS RECEIVED.

A GUIDE TO THE ALTERATIONS IN THE BRITISH PHARMACOPŒIA (1885). By PROSSER JAMES, M.D. Third Edition. London: J. and A. Churchill. From the Publishers.

REPORT OF THE FOURTH INDIAN NATIONAL CONGRESS held at Allahabad, December, 1888. London: Indian Political Agency. From the Publishers.

PHARMACOGRAPHIA INDICA. A History of the Principal Drugs of Vegetable Origin met with in India. By WILLIAM DYMOCK, C. H. J. WARDEN and DAVID HOOPER. Part I. London: Trubner. 1889. From the Authors.

WATTS' DICTIONARY OF CHEMISTRY. Revised and Entirely Rewritten. By M. M. PATTISON MUIR, M.A., and H. FORSTER MORLEY, M.A., D.Sc., assisted by Eminent Contributors. Vol. II. London: Longmans, Green and Co., 1889. From the Publishers.

WATTS' MANUAL OF CHEMISTRY: Theoretical and Practical. (Based on Fownes' Manual.) Vol. I. Physical and Inorganic Chemistry. Second Edition. By WILLIAM A. TILDEN, D.Sc., F.R.S. London: J. and A. Churchill, 1889. From the Publishers.

WHAT TO DO IN CASES OF POISONING. By WILLIAM MURRELL, M.D., F.R.C.P. Sixth edition. London: H. K. Lewis. 1889. From the Publisher.

A TEXT-BOOK OF ORGANIC CHEMISTRY. By A. BERNTHSEN, Ph.D. Translated by George M. GOWAN, Ph.D. London: Blackie and Son. 1889. From the Publishers.

ANSWERS TO CORRESPONDENTS.

R. J.—*Polygonium cuspidatum.*

Nemo.—(1) The properties of a potash compound with the fat acids. (2) An oxide of phosphorus. (3) The reaction would depend upon the composition of the coin; probably there would be a solution of the nitrates of silver and copper formed, with evolution of nitric oxide gas and nitric anhydride.

Inquirer.—We do not think the formation of a precipitate could be avoided.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Clague, Martin, Thresh, Salmon, Sleath.

SENNA PODS.

BY E. F. SALMON,
Pharmaceutical Chemist.

In the *Lancet* of July 27, 1889,* appeared a "Note on the Therapeutic Action of Senna Pods," written by Dr. Macfarlane, Examiner in Forensic Medicine, University, Glasgow. My attention was directed to it by a member of the medical profession, who requested me to procure some of the pods, and prepare an active preparation of the same, as had already been done for Dr. Macfarlane by Mr. Borland. This I did, and prepared a fluid extract which has since been prescribed and used with very satisfactory results. As probably other pharmacists will be applied to on the same subject, the following notes may be of interest :—

The active purgative principle of senna is cathartin, which is a combination of cathartic and phosphoric acids with magnesium and calcium bases ; this substance may be thrown out of an aqueous solution by alcohol, first adding sufficient to throw down the gum, albumen, etc., and then an excess to precipitate the cathartin.† Two comparative experiments showed that the pods are richer in this substance than the leaves, the latter yielding 2 and the former 2½ per cent. when treated as above. In addition to cathartin there is found in the leaves a resinous principle and a volatile oil; these are practically absent in the pods.

The pod or legume consists of the two valves of the carpellary leaf, bearing about half a dozen seeds attached by a capillary funiculus to the marginal placentas ; each valve consists of three layers, the outer, epidermis, pierced with stomata and easily pervious to water; next, a central mass of parenchyma traversed by the "veins;" it is in this layer that the cathartin is stored; lastly, a fibrous tissue devoid of active principle.

The advantages claimed by Dr. Macfarlane in the use of the pods over the leaves are the absence of nauseous taste and of tendency to cause griping pains, both of which are associated with the use of the leaves. It was shown in a paper printed in the *Pharmaceutical Journal*, March 18, 1876, by C. L. Diehl, that senna leaves, when previously treated with alcohol and then dried, will give preparations which, while possessing the purgative qualities, are tasteless and do not gripe.

The treatment with alcohol had removed the resinous and odorous principles to which the griping and nauseous taste are due, leaving the cathartin unchanged, it being insoluble in alcohol.

The pods being richer in cathartin, and not containing either resin or oil, render them especially well adapted for use as an efficient aperient, and one not too rapid in action.

Cold water readily dissolves out the cathartin from the pod, which it will not do from the leaf, owing to the impervious nature of its epidermis. Accordingly for the preparation of a fluid extract, cold water will be found the best menstruum. Two macerations of the carefully picked over pods, which should also be torn in pieces, will be found to practically exhaustt hem. The first maceration should be for twenty-four hours, for the second twelve is sufficient. For 1 lb. of pods six pints of cold distilled water for the first and about three pints for the second maceration, is a sufficient quantity to use, the liquors when strained off to be evaporated to 13 fluid ounces and the usual 4 ounces (25 p. c.) of spirit added, and after standing a few hours to be filtered, and if necessary made up to 16 fluid ounces with distilled water.

This makes an almost black looking liquid of specific gravity 1040 (average), perfectly tasteless, and of which the adult dose is ½ to 2 fluid drachms, the smaller dose seldom failing to produce purgation.

* See *Pharmaceutical Journal*, August 31, p. 164.
† 'Pharmacographia,' p. 219.

NOTES ON ESSENTIAL OILS FROM MESSRS. SCHIMMEL AND CO.'S OCTOBER REPORT.

(*Continued from page* 264.)

Clove Oil.—Criticizing the specific gravity of 1·041 to 1·060 given in the German Pharmacopœia for oil of cloves, Messrs. Schimmel state as their experience that genuine oil of cloves has a specific gravity of 1·067 and oil of clove-stalks one of 1·063. They therefore think the requirement should be altered to a specific gravity of not under 1·060.

Elemi Oil.—Oil distilled from elemi resin by Messrs. Schimmel has been examined by O. Wallach, who found it to have a specific gravity of 0·900 and to be dextrorotatory. It contains considerable quantities of right-handed phellandrene, whilst in the portion boiling between 175° and 180° C. there is so large a quantity of dipentene that the oil would appear suited for the preparation of dipentene compounds. In addition there is a large quantity of constituents having higher boiling-points and the amyrin of the resin appears to be represented in the oil.

Eucalyptus Oil.—Some oil that has been received from Australia as a product from *Eucalyptus odorata* is spoken of very favourably. It has a specific gravity of 0·907 at 15° C. and gives with hydrobromic acid a strong eucalyptol reaction. It is said to answer to the requirements of a good oil and to be as suitable for therapeutic purposes as the oil of *Eucalyptus Globulus*. This Australian oil is packed somewhat differently from the *E. amygdalina* oil hitherto received, the case containing four tins, each holding 18 lbs. of oil. From the south of Spain an oil of *E. Globulus* has been received that is so rich in eucalyptol, or cineol, that upon placing it in a cooling mixture it solidifies to a paste. It has a specific gravity of 0·931 at 15° C. The Californian oil from *E. Globulus* is reported to have shown lately considerable variation in the amount of eucalyptol it contained, probably on account of some having been removed ; a normal oil should contain from 50 to 70 per cent. of eucalyptol. The oil of *Eucalyptus dumosa* also contains a large quantity of eucalyptol.

Fennel (Japanese).—Under the name "anise" a sample of Japanese fennel has made its appearance in the market, which although it had the aroma and taste of fennel, presented an extraordinary similarity to anise in the form and size of the grain. Any doubt that might have existed was removed by the plants that resulted from sowing of some of the seed. According to Rein the Japanese fennel is derived from the same species as the European,—*Fœniculum vulgare*, Gaertner (*F. capillaceum*, Gilibert),—and is much used in Japan as a pastry spice. Arrangements have been made for a supply of the seeds with a view of examining the oil that they yield.

Kesso Root Oil.—The oil distilled from the Japanese "kesso" roots (*Valeriana officinalis*, L., var. *angustifolia*) is, in Messrs. Schimmel's opinion, probably to be esteemed quite equal in its practical characters to the German distillate and may be used unreservedly in its place for technical purposes. The high specific gravity of the kesso oil is attributed to the presence

of a heavy constituent having a high boiling point, which is at present unknown and has not been observed in ordinary valerian oil.

KURO-MOJI OIL.—Further information has been received from Japan respecting the kuro-moji oil referred to in the last previous report (*Pharm. Journ.*, April 20, p. 844). Mr. Murai, of the Sanitary Laboratory, Tokio, writes that the oil was unknown in the Japanese market until the last few years, but the plant from which it is derived (*Lindera sericea*, Blume) is a tree indigenous in every district in the country. The wood, together with the bark of the tree, is used in the preparation of a dentifrice on account of its pleasant odour.

OLIBANUM OIL.—Wallach has found that the terpene of this oil, which has hitherto been called "olibene," is identical with pinene, and further that the oil also contains a small quantity of dipentene.

ORANGE-FLOWER OIL.—An interesting experiment has been made this year in the transmission of freshly-picked orange-flowers from the south of Spain to Germany. The flowers were packed in casks, from which the air was pumped out after filling, and are said to have borne their transport well. They proved to have been gathered from the sweet orange (*Citrus vulgaris*) and yielded the known, but not esteemed neroli-portugal oil. From 800 kilos of flowers 1·150 kilo of pure essential oil was obtained, but the orange-flower water produced was worthless. The bitter orange (*Citrus vulgaris*, Risso; *Citrus aurantium amara*, L.), which yields the fine orange-flower oil and water, appears to be only little cultivated in southern Spain.

ROSEMARY OIL.—A sample of pure Italian rosemary oil of the year 1887 was found to have a specific gravity of 0·902; 89 per cent. of it distilled at a temperature of 200° C. and under, and 5 per cent. between 200° and 220° C. A sample of the year 1888 had a specific gravity of 0·905; 88 per cent. passed over at a temperature of 200° C. and under, and 6 per cent. between 200° and 220° C. These data are of importance in view of the fact that oil of rosemary is now used largely in Germany for the denaturizing of spirit, and the official regulations require that for this purpose the oil shall have a specific gravity of 0·900, and that at least 90 per cent. of the oil shall distil over at 200° C. It is pointed out that in order to bring a genuine oil within these requirements it would be necessary to remove part of the heavier and higher-boiling constituents, which are camphor and borneol.

THYME OIL.—The German Pharmacopœia requires that oil of thyme, when dissolved in half its weight of spirit should not give a yellowish red colour upon the addition of a drop of ferric chloride solution. In this report it is stated that an oil from which the thymol has been removed by shaking it with soda solution may answer to this test, but that a pure oil, not deprived of its thymol, will give with ferric chloride a dirty greenish-brown colour, afterwards changing to red. The reaction is said to be due to a phenol that accompanies thymol in the oil.

The novelties mentioned in this report are as follows:

GARLIC OIL.—From bulbs of *Allium sativum*, L. From 900 kilos of raw material Messrs. Schimmel obtained 800 grams of a pure oil, having an intense odour and taste of garlic, which it is thought might be used in the preparation of piquant sauces, pickles, etc. Experiment seemed to show 10 grams of the oil to be equal to about 11 kilos of fresh garlic. The oil has a sp. gr. of 1·053 at 15° C., and is to be further investigated.

SPANISH OILS.—The following essential oils have been received from a newly established manufactory in the province of Granada, in the south of Spain. The information immediately following the name has been supplied by the distillers. Some remarks by Messrs. Schimmel are enclosed between brackets:—

OLEUM ARISTOLOCHIÆ SUBGLAUCÆ.—Distilled from the fresh flowering shoots of *Aristolochia subglauca*, Lank. et Brot. (*A. glauca*, Desf.). The yield of oil is very low and the plant is not widely distributed. The oil is used as an emmenagogue. [Has a disagreeable valerian-like odour. Useless for perfumery purposes.]

OLEUM ARTEMISIÆ BARELLIERI.—This oil, obtained from the dried flower racemes and fresh young shoots, might probably be used as a substitute for oil of wormwood. This species of *Artemisia* yields a carminative used in the district apparently with good results in colic (even in severe lead colic), and hysterical and epileptic attacks. [Sp. gr. 0·923 at 15°. Boils between 180° and 210°. In odour this oil resembles strongly oil of tansy, it being agreeably and powerfully aromatic.]

OLEUM ARTEMISIÆ HISPANICÆ.—Distilled from the fresh young shoots of *Artemisia hispanica*, which although somewhat less frequent than *A. Barellieri*, would allow of the production of a considerable quantity of oil. Both species are said to be used in the manufacture of Algerian absinthe. The plant is popularly reputed to exercise a depressing influence on the genital organs. [This oil would be difficult to make use of practically. In odour it somewhat resembles wild fennel.]

OLEUM CISTI LADANIFERI.—Obtained from the leaves, a decoction of which is used generally against rheumatism, syphilitic complaints and affections of the respiratory organs. [Sp. gr. 0·925 at 15° C. Boils between 165° and 280° under partial decomposition with a strong odour of acetic acid. The odour of the oil is unpleasantly narcotic and stupefying. The ladanum is said to be obtained in Spain by boiling the branches.]

OLEUM FŒNICULI.—From the young shoots of the wild fennel, which attains in the district a height exceeding two meters. [This oil is identical with the so-called "bitter fennel oil," as distilled in the south of France.]

OLEUM HELICHRYSI STŒCHADIS.—Obtained from the flowering plant, which is used in bladder and kidney affections. [About three-fourths boils between 155° and 170°, and one-fourth between 170° and 260°. Specific gravity 0·873 at 15° C. The oil has an odour similar to that of the distillates of the smaller coniferæ. Most probably contains much pinene.]

OLEUM JUNIPERI OXYCEDRI.—Prepared from the fresh tops of the branches, which are used as a powerful abortive, and especially in female disorders. The yield is very small. [This oil has not been closely examined, since it has no practical importance. It resembles in odour a fine pine-needle oil.]

OLEUM LAVENDULÆ DENTATÆ.—The therapeutic properties attributed to previous oils of this class are alleged to be possessed by this oil in even a still higher degree. It is said to promote the healing of sluggish wounds, and when used in the form of inhalation to have given good results in severe catarrh and in two cases of diphtheria. [Specific gravity 0·926 at 15° C. It distils almost completely between 170° and 200°. Cineol was detected in it. In odour it strongly suggests rosemary oil and camphor.]

OLEUM LAVANDULÆ STŒCHADIS FLOR.—Obtained from the freshly collected flowering tops of *Lavandula Stœchas*. The plant is known in Spain as "romero santo" (sacred rosemary), and its essential oil, as well as that of *L. dentata*, is obtained for household use by suspending the fresh flowering stalks, flowers downwards, in closed bottles and exposing them for some time to the sun's rays. A mixture collects at the bottom of water and essential oil, which is used as a hæmostatic and for cleansing wounds. [Sp. gr. 0·942 at 15° C. Boils between 180° and 245°, cineol being present in thelowest boiling fraction

The odour of the oil in no way suggests that of lavender, but resembles more that of oil of rosemary, with which it has the camphoraceous smell in common.]

OLEUM MARRUBII ALYSSON.—Obtained from the flowering tops of *M. Alysson*, L., var. *lanatum*, Casson. The plant has a reputation as a remedy for affections of the chest and throat, and possibly possesses febrifuge properties.

OLEUM MENTHÆ AQUATICÆ.—From the fresh young shoots of the water-mint, which in some of the ravine districts of South Spain grows abundantly and luxuriantly to a height of two metres. [Yellowish-green oil, with a pennyroyal-like mint odour.]

OLEUM ROSMARINÆ.—Obtained from freshly collected young shoots and leaves. [In parallel experiments it was ascertained that this Spanish oil contains the same constituents as French oil of rosemary, but in different proportions. Pinene was recognized through the pinene-nitrol-piperidin compound, m. p. 118° C. Specific gravity of the oil 0·892 at 15°. The oil is scarcely to be distinguished from fine French oil.]

OLEUM RUTÆ. — Obtained from fresh flowering stalks of *Ruta graveolens*, attaining a height of 1½ metres. [This oil is superior in quality. Sp. gr. 0·859 at 15° C.].

OLEUM SATUREJÆ THYMBRÆ.—Obtained from the fresh herb, which by the ancient Greeks was consecrated to Pryapos, and in Spain is used generally as a spice, and especially for olives. It has also a reputation as a powerful stimulant and disinfectant. [The oil has a specific gravity of 0·906 at 15° and contains 19 per cent. of thymol. Upon careful fractionation it yielded pinene in the portion boiling at 160°, but the greater portion of the oil consisted of cymol, boiling at 175°. In the following fraction a small quantity of dipentene was found, and upon saponification of the portion boiling at over 200° borneol and acetic acid were obtained, these two bodies consequently existing in the oil in the form of the acetic acid bornyl ether. The oil has an extremely powerful and penetrating thymol odour.]

OLEUM SOLIDAGINIS.—Distilled from the fresh young shoots of a species of *Solidago* growing in the south of Spain to a height of 2 metres, and popularly esteemed as a hæmostatic and blood purifier. The yield of oil is small. [The oil has an aromatic and somewhat mint-like odour, like that of the American golden rod oil. Practically it has scarcely any value.]

OLEUM TEUCRII FUNKIANI.—Distilled from the flowering herb of the strongly aromatic bitter *T. Funkianum*, Willk. The collection of the plant is expensive and the yield of oil small. [The oil has an undefinable odour.]

OLEUM THYMI CAPITATI. — Prepared from the freshly mowed herb of the classic honey plant of Mount Hymettus. The freshly distilled oil has a specific gravity of 0·888 at 18° C. A characteristic reaction of the oil is that when shaken with water it imparts to the latter a peach-red colour. [The oil much resembles in its composition the oleum saturejæ thymbræ. It has a specific gravity of 0·901 at 15° C., but the quantity of thymol is considerably smaller, amounting to about 6 per cent. Besides thymol there is present another liquid phenol, the boiling point of which is near to that of thymol. The other constituents are the same as those in the oil of *Satureja Thymbra*, consisting of pinene, cymol, dipentene and acetic acid bornyl ether. The oil has a powerful thyme-like odour recalling that of origanum.

ANDROPOGON FRAGRANS OIL.—Under the name "Huile essentielle de Pataque Malgache" a new oil has been introduced from the island of Reunion, which is represented to be a distillate from *Andropogon fragrans*. It is a yellowish thick liquid having an odour undistinguishable from that of East Indian ginger-grass oil (*Andropogon Schœnanthus*).

The Pharmaceutical Journal.

SATURDAY, OCTOBER 12, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE SALE OF DEFECTIVE AND SPURIOUS MEDICINAL PREPARATIONS.

A FEW days since the London papers commented on some cases of prosecution under the Food and Drugs Act, which were in one instance represented as being "calculated to give a rude shock to our confidence in chemists' preparations." The prosecutions in question took place at Wakefield, in Yorkshire, and it was stated that extremely defective sweet spirit of nitre, as well as paregoric "without opium," had been supplied by a "chemist." Upon making inquiries, however, it turns out that the seller of these articles was a grocer, and that one of them had been specially manufactured to enable the seller to steer clear of the Pharmacy Act. It is satisfactory to find that this ingenious but discreditable device was not a complete immunity, for the magistrates held that in trying to evade the Pharmacy Act the seller of this article under the name of paregoric had broken the Food and Drugs Act, and he was condemned to pay a fine and costs amounting to £2 15*s*. So far as concerning the apprehended "rude shock to our confidence in chemists' preparations," it will be seen that the circumstances of these prosecutions do not afford any ground for it. The reputation of chemists was in no degree affected by the disclosures that took place, except in so far as every person selling drugs or medicinal preparations is, in popular estimation, set down as a chemist whether he be so or not, the discredit of selling defective or spurious preparations being thus often unjustly cast upon his class when in fact the offence is committed by unqualified dealers, who are the cause of serious damage to chemists by their competition.

If the subject were not one of serious importance, no less to the general public than to registered chemists, the mode in which these cases are dealt with in a local paper would be amusing. In an article upon the prosecutions the *Wakefield Express* holds the opinion that the public will no doubt "sympathize with the tradesman who was the defendant," as he is regarded by that paper as the unconscious and innocent medium through which preparations were obtained which were not what they ought to be. Surely this is a strange basis for claiming sym-

pathy. But in addition to this it is urged in favour of the defendant, that the admitted carelessness in keeping sweet spirit of nitre alleged to be the cause of its defective character was only that sort of carelessness which arises from ignorance of the ingredients of this article and of the volatile character of its essential constituent. This is at best but a lame defence, and to our apprehension it partakes more of the nature of a severe condemnation that a person should venture to deal in articles of whose nature he is ignorant. In the case of all drugs and medicinal preparations it is of the first importance that the seller should have a thorough knowledge of the articles he deals in. It is only where this important necessity is disregarded either by sellers or purchasers that there is any real danger of a rude shock to confidence in chemists' preparations. The public as a rule is much too little cognizant of this fact, and hence it is a common practice to obtain supplies of drugs and medicines from shops kept by persons who have no kind of qualification for dealing in such articles.

There is, however, another point of view from which the cases above mentioned become of especial interest for readers of this Journal, and for all those who desire to protect the general interests of pharmacy as a business. We refer now to the evidence that was given to show that the illegitimate trade in medicinal preparations, such as the Wakefield grocers appear to have carried on, is actually assisted, if not promoted, by members of the body that is directly damaged and prejudiced by the practice. Such a state of things might well be regarded as inconceivable, if it were not that the persons so engaged in supplying grocers with defective and even fictitious articles for sale under the name of well-known medicinal preparations came forward and testified to the fact. There does not indeed appear to have been any disposition to reticence on their part, such as might have been expected, but on the contrary it was suggested as a justification of this system that it was the "common practice of the trade." Accepting that representation as correct, it may well be asked what opportunity can there be under such a state of things for that protection of trade interests which we so often hear that pharmacists and even chemists and druggists are in need of? Is it not requisite that there should be some better recognition of the pharmacist's duty to his neighbour and, we may add, even of his duty to himself? Of what avail can it be for the individual chemist to be punctilious in regard to the quality of the articles he supplies to his own customers if at the same time he countenances a pernicious practice of furnishing grocers and general dealers with inferior articles that he would not venture to sell himself? Even if he is not directly a party to such practices it is incumbent upon him to condemn them and to offer every possible assistance towards their suppression. In the cases now referred to, however, we find that these obligations are not recognized. Registered chemists and druggists acknowledge that they support the irregular competition of grocers in the sale of medicinal preparations by supplying them with articles such as paregoric "without opium," ostensibly in order that they may escape the penalties of the Pharmacy Act, and actually that they may, by selling such spurious medicines at a lower price than chemists can supply the genuine article, carry on an unfair competition with the men who are alone competent to carry on the business of pharmacy. In the case of wholesale houses it may be that we shall be told that it is impossible to resist the demands made upon them to supply just what their customers require; but whatever foundation there may be for such a plea, it behoves chemists to be careful that it is not acted upon to their own detriment. It is especially necessary that this should be done now when so much of the detail of pharmacists' work has been taken in hand by the wholesale druggist. It is not only needful that the preparations obtained from such sources should be carefully tested; but it is also requisite to ascertain that wholesale houses are not providing irregular means of competition with chemists.

According to a prospectus issued by the executive of the North of England Pharmaceutical Association, the following arrangements have been made for classes at the Durham College of Science, Newcastle-upon-Tyne, in which instruction shall be given adapted to the requirements of students in pharmacy. In the division of Chemistry, which is under the superintendence of Professor Bedson, there will be a course of about sixty lectures on Theoretical Chemistry, delivered on Tuesday and Wednesday evenings, between 8 and 9 o'clock, and the Chemical Laboratory will be open for practical work on Tuesday and Friday evenings from 6 to 8 o'clock. The Botany class will meet on Friday evenings at 8 o'clock, until the end of March, the lecturer being Mr. C. E. Stuart. A course of similar length on Materia Medica will be conducted on Wednesday evenings between 7 and 8 o'clock, by Mr. Alfred Wright. Lastly, Mr. B. S. Proctor will, on Monday evenings, from 8 to 9 o'clock, deliver a course of about ten lectures on Pharmacy, which will consist of an exposition of pharmaceutical operations. Copies of the prospectus and other particulars may be obtained from the Secretary to the Association, Mr. Ford, care of Ismay and Sons, Groat Market, Newcastle.

* * *

The first meeting of the Liverpool Pharmaceutical Students' Society will be held on Friday, October 18, at 8.30 p.m., in the drawing-room of the Young Mens' Christian Association, Mount Pleasant, when the President and Vice-President will be elected for the ensuing session.

* * *

According to the *Pharmaceutische Zeitung* an order has been issued by the Russian Medical Department to the effect that in future antifebrin, antipyrin, phenacetin and cocaine shall only be supplied by pharmacists upon the prescription of a medical practitioner.

Transactions of the Pharmaceutical Society.

PRELIMINARY EXAMINATION.

October 8, 1889.

The following are the questions that were set for the Preliminary examination on the 8th inst.:—

LATIN.

(*Time allowed—from* 11 *a.m. to* 12.30 *p.m.*)

I. (*For all Candidates.*) *Translate into Latin:—*

1. The army of Ariovistus, the King of the Germans, had conquered the Gauls.
2. He will do it if he is able.
3. No animal is more faithful to man than the dog.
4. The name of Brutus was given to the youth.
5. At what price did you buy the bread? For a small sum.

II. Translate into English either A. (Cæsar) or B. (Virgil).

(*Candidates must not attempt both authors.*)

A. CÆSAR.

1. Quum ea ita sint, tamen, si obsides ab iis sibi dentur, uti ea, quæ *polliceantur*, facturos intelligat, et si Æduis de injuriis, quas ipsis sociisque eorum intulerint, item si Allobrogibus satisfaciant, sese cum iis pacem esse facturum. Divico respondit: Ita Helvetios a majoribus suis institutos esse, uti obsides accipere, non dare, *consuerint*; ejus rei Populum Romanum esse testem. Hoc responso dato, *discessit*.

2. Id ne accideret, magnopere sibi præcavendum Cæsar existimabat; namque omnium rerum, quæ ad bellum usui erant, summa erat in eo oppido facultas; idque natura loci sic muniebatur, ut magnam ad ducendum bellum daret facultatem, propterea quod flumen Dubis, ut circino circumductum, paene totum oppidum cingit, reliquum spatium, quod est non amplius pedum sexcentorum, qua flumen intermittit, mons continet magna altitudine, ita ut radices ejus montis ex utraque parte ripæ fluminis contingant.

Grammatical Questions.—For those only who take Cæsar.

1. Decline in full—*omnium rerum*, *summa facultas*, *ejus montis* (par. 2).
2. Write in full the indicative present and subjunctive pluperfect of the verbs in italics (par. 1).
3. Write down the comparative and superlative degrees of *liber*, *gracilis*, *multus*, *parvus*.
4. Write in Latin—12, 37, 18*th*, 76*th*, *six each*, *fifteen each*, *twice*, *seven times*.

B. VIRGIL.

1. Parce metu, Cytherea; manent immota tuorum
Fata tibi; cernes urbem et promissa Lavini
Mœnia, sublimemque feres ad sidera cœli
Magnaninum Æneam; neque me sententia vertit.
Hic—tibi fabor enim, quando haec te cura remordet,
Longius et volvens fatorum arcana movebo—
Bellum ingens geret Italia, populosque feroces
Contundet, moresque viris et mœnia ponet,
Tertia dum Latio regnantem viderit aestas,
Ternaque transierint Rutulis hiberna subactis.

2. Necnon et vario noctem sermone *trahebat*
Infelix Dido, longumque bibebat amorem,
Multo super Priamo rogitans, super Hectore multa;
Nunc, quibus Auroræ venisset filius armis;
Nunc, quales Diomedis equi; nunc, quantus Achilles.
Immo age, et a prima *dic*, hospes, origine nobis
Insidias, *inquit*, Danaum, casusque tuorum,
Erroresque tuos; nam te jam septima portat
Omnibus errantem terris et fluctibus aestas.

Grammatical Questions.—For those only who take Virgil.

1. Decline in full—*haec cura*, *populos feroces*, *bellum ingens* (par 1).
2. Write in full the indicative present and subjunctive pluperfect of the verbs in italics (par 2).
3. Write down the comparative and superlative degrees of *liber*, *gracilis*, *multus*, *parvus*.
4. Write in Latin—12, 37, 18*th*, 76*th*, *six each*, *fifteen each*, *twice*, *seven times*.

ARITHMETIC.

(*Time allowed—from* 12.30 *p.m. to* 2 *p.m.*)

[The working of these questions, as well as the answers, must be written out in full.]

1. Multiply 5 oz. 2 scr. 10 gr. by 1069.
2. How long will it take to walk round a square field containing 13 acres, 81 yards, at the rate of $3\frac{1}{3}$ miles an hour?
3. What fraction of $\frac{2}{3}$ of 10*s.* 6*d.* is $\frac{1}{2}$ of $\frac{3}{7}$ of 6*s.* 5*d.*?
4. Reduce $\frac{9}{13}$ of £10 6*s.* $7\frac{3}{4}d.$ to the decimal of £·015.
5. How many yards of paper 1·41$\dot{6}$ feet broad will be required for a room 13·$\dot{3}$ feet high, 15·5 feet long, and 7·1$\dot{6}$ feet broad?
6. If a man walks $4\frac{1}{2}$ miles in 72 minutes, how many *metres* does he walk in 1 hour?
7. A bankrupt paid 10*s.* 6*d.* in the £. He owed £575 10*s.* to two persons, one of whom received £147. How much did he owe the other?

ENGLISH.

(*Time allowed—from* 3 *p.m. to* 4.30 *p.m.*)

[Read carefully the following passage before answering questions 1, 2, and 3, which refer to it.]

"Alas! regardless of their doom,
The little victims play!
No sense have they of ills to come,
Nor care beyond to-day.
Yet see how all around them wait
The ministers of human fate,
And black Misfortune's baleful train!
Ah, show them where in ambush stand,
To seize their prey, the murderous band!
Ah, tell them they are men."

1. Parse fully the words *alas*, *regardless*, *beyond*, *show*, *where*, *their*.
2. Name the subjects, and where possible the objects, of the verbs *play*, *have*, *wait*, *show*, *stand*.
3. Write out a list of all the adjectives, and where possible give their degrees of comparison.
4. In the following passage supply the necessary capital letters, and put in the stops and inverted commas where requisite:—is mrs varden at home said mr chester sir returned sim eyeing him over with a look of concentrated expression she is did you wish to see her mr chester nodded then come this way sir said sim wiping his face upon his apron follow me sir would you permit me to whisper in your ear one half a second by all means.

*5. Give a short biography of some eminent English statesman or soldier of the eighteenth century, *or* an outline of one of Shakespeare's plays.

Pharmaceutical Society of Ireland.

OCTOBER LICENSE EXAMINATION.

The following candidates have successfully passed the Society's examination:—Messrs. Albert Edward O'Connell, Charles Marshall, and William Hanna.

This must be attempted by every Candidate.

Provincial Transactions.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The inaugural address, in connection with the first session of the Association, was delivered in Speed's Hall, Commercial Street, on Thursday evening, October 3, by Mr. W. Gilmour, F.R.S.E., Chairman of the Scottish Executive of the Pharmaceutical Society. There was a large attendance of masters, assistants and apprentices, about 130 being present. Ex-Bailie Doig, one of the honorary Vice-Presidents, occupied the chair.

The Chairman, in the course of a few introductory remarks, referred to the fact that an Association, such as they were about to inaugurate, had existed in Dundee about twenty-five years ago, but that the removal of some of the leading spirits, and other causes, had brought that Association to an untimely end. He was glad, however, to have the opportunity of once more being present at such a meeting, and congratulated the members on the very successful start which had been made. He trusted that, among other advantages, they would obtain shorter hours. The Association had been the outcome of the half-holiday, a movement which he hoped they would carry out again next year, and that they would not stand alone in Scotland in this respect. Mr. Doig thereafter touched upon educational matters as concerning the younger members of the craft present. He reminded them of the exceptional facilities they possessed in Dundee for the acquirement of the necessary knowledge in those technical subjects which they particularly require, and pointed out that at all the classes the fees were no barrier. He appealed to the masters present, that they should endeavour to give their students the time for study, and in concluding an eloquent and earnest speech, reminded the young men that youth is the seed-time, that we are sowing now, and that we shall reap hereafter. He had the greatest pleasure to preside on this occasion, and he was confident that by the members binding themselves one to another and helping each other, not only the assistants themselves but also their principals, would be benefited by the work of the Association. He had much pleasure in calling on Mr. Gilmour, and had to acknowledge their deep debt of gratitude to him for having so kindly undertaken to deliver—

The Inaugural Address.

Mr. Gilmour, who was received with hearty applause, said: Gentlemen, It is not my intention to take up your time with any lengthened apology for appearing before you this evening. There are some duties which press in upon one in his official or semi-official capacity, which would probably never be undertaken in one's private individuality, and the duty of giving an Inaugural Address is, I think, one of them. However, I did feel when I received the invitation from your Secretary, Mr. Henderson, that some recognition was due to the enterprise and energy which, against many adverse circumstances, had successfully floated your Association, and while entirely ignoring my own individuality, I resolved to come north and give you my heartiest sympathy, as well as the little influence which my presence amongst you was calculated to afford.

Now, gentlemen, I intend to-night not to give you any elaborate address, but rather to have a plain simple practical talk with you. In my experience many inaugural addresses, as well as closing addresses, partake too much of the sermonizing element, the "let us be up and doing" style, which certainly does for a time excite the feelings, but which produces only evanescent effects, being very much like the morning cloud and early dew. I would rather to-night seek to talk to you for a short time in the plainest of language, a little about your Association, a little about yourselves, a good deal about your profession, touching also upon the question of education, and finishing up, for appearance sake, with the orthodox finally and in conclusion. In carrying out this programme you will, I hope, quite understand that I will endeavour to ignore the personal pronoun, and yet you may trace in my remarks, or rather, as I should say, in my talk, very much of my own life and experience.

Is this not after all the best experience I could give for young men entering upon your career? I have been a student all my life, and I hope I will continue a student until the receptive faculties fail me, and whether from the living lips or inspired book do we not all in the highest sense remain students to the end of the chapter? It is thus in this sense, namely that of a student, that I would like you first of all to approach and undertake the work of your Association. No one has, and no one ever can, reach perfection, whatever his calling may be; but we can all aim at perfection, and the higher our standard the higher will be our results, and every endeavour will be something gained, leaving us on a higher platform than before.

Now I confess that I am here at this point very much tempted to sermonize regarding this higher platform, and all that sort of thing, as it is rather a favourite subject of mine, but I think my better plan will be to refer this for the application, if I ever get to this point. You assistants and apprentices have certainly reached a higher platform—not the highest by any means—but one higher than you have ever reached before, in combining and forming yourselves into an Association for your mutual improvement and edification. I know of no means better calculated to ballastand educate young men than such an Association as that which you have now formed. I purposely say ballast and educate, for I believe that there is not a young man who does not recognize the fact that the theatre, the beer saloon, the billard-room, or the race-course, are quite incompatible with the steadying, educating force which emanates from such associations.

I cannot point to a better illustration of what I mean than to the influence which the Edinburgh Assistants and Apprentices' Association has exerted on the young men there. Never in all my experience have I known a superior class of young men, either morally, intellectually, and I think I might also add physically, than is now to be found in Edinburgh, and this I ascribe in a very great degree to the Association which has flourished there for so many years. The reason is obvious. There is a healthy *esprit de corps* engendered; the young men get to know and respect each other, friendships are formed, information is given and received, and, above all, a centre is formed which draws and retains young men with aspirations probable undefinable in their very immaturity, but aspirations which under the maturing influence of such associations may develope in the future into any possibility.

Yes; I am glad for the sake of pharmacy, and above all, I am glad for your own sakes, that an Association has been formed in such a large and important centre as Dundee, and just in proportion to your success will be the pleasure that I was present at the inauguration of its first session. Now let me for a moment just refer to one or two little points; little, but not unimportant, because they may make or mar your Association. One point is ever to remember that you are gentlemen, gentle men in the true sense of the word, namely, in that you are ever kind and courteous to one another and everyone with whom you associate. Young blood is very hot and very hasty, and the temptation may often be very strong to say a smart thing or pass a severe criticism upon a weak brother. Now I hope you will not misunderstand me. I believe

in calling a spade a spade, and not in calling it by the more euphonious title of an agricultural instrument; I also believe that an honest, straightforward criticism will always do good and not harm. At the same time I have observed that more associations are ruined or crippled by the attempt of members to pass smart criticisms and clever comments on the papers of their brother members than from any other cause. Whenever anyone differs from you, and especially if your feelings are very high, you are very apt to style him a fool, or in more vulgar language still an ass. Now, brothers, this is not gentlemanly, nor is it true. This is not calling a spade a spade; it is simply stigmatizing your friend, or who should be your friend, and attempting to bring him into ridicule, and quite naturally suspicions, jealousies, evil speaking and all other angry passions rise.

The world is wide enough for all opinions, and one of the first lessons and most important in our younger years, which we have to learn, is to be tolerant; that is to say, gentlemanly regarding our fellow men's opinions. Be just then in all your criticisms, ever leaning to mercy's side, and ever remembering that some timid shrinking spirit may for ever, or at least for long, be extinguished under the lash of your severe sarcasm.

Another point in connection with your Association is that you must all be workers. Drones are, to say the least, drags upon an association; they add, no doubt, to its numbers, but do not add to its strength.

Every member should be a worker, and every member should therefore endeavour to contribute his mite to the general information and general good of the Association.

Now you may do this in two ways; you may do it by contributing short practical papers upon what you observe or upon what you discover in your daily work, or you may do it by short pointed observations on the papers read. Regarding the first of these methods I have often been asked the question, "But what can we investigate or write upon?" My young friend, in reply to this I tell you that there is not a single department, far less a single subject in pharmacy, upon which you may not experiment and discover something new. Take the commonest subject you can think of, take an ounce of epsom salts or a pennyworth of sulphur, and investigate them in all their chemical, physical, and even medicinal properties, and I will be bound to say that you will be astonished at the undeveloped potentialities which will lie even in these commonplace substances. There is scarcely a mixture which you make up, or an operation which you perform, or a substance which you handle that does not contain some unknown factor in its physical, chemical or medicinal futurity. Herein lies I think one of the greatest features of our profession, and one which distinguishes it from all others, and makes even the most commonplace operation interesting.

There is practically no end to the variety and scope to our investigations and operations. In connection with this keep in mind that a short concise practical paper upon an every day subject is infinitely better than the most elaborate essay. You may get applause for the last, but it will be the applause of a fagged out, wearied meeting, glad in the fact that you are simply finished. For the former you will get the hearty thanks of all, and probably, what is equally important, be the means of inaugurating an interesting debate. Now in debate I would not advocate talking for talking's sake. There are some men who can talk on for ever, and from whom words flow as water from a sieve. What is required is that your ideas be focussed into clear pithy language, and this can only be done after much experience. When a very little boy, I remember frequently having occasion to go into a certain agent's office, on the walls of which was suspended in a conspicuous position the following legend, which I dare say would nowadays be considered more pithy than polite: "Notice: This office is conducted on business principles, you are therefore requested to do your business in business hours, and when you have done your business, go about your business, and leave business men to do their business." I recall this at present because it is always associated in my mind with the advice which a shrewd old minister once gave to a young co-Presbyter: "John, tak my advice and never rise to speak unless when you have got something to say, and when you have said it sit down." But while admitting that life is too short and earnest to admit of spending much of it in hearing lengthy or frothy speeches, nay, let me say that it is because of this that I would advise every one of you to take part in any debate or criticism going on from time to time in your Association. You may wonder at me dwelling on a point so small seemingly; but by-and-bye, if ever you rise to any public position, as I hope many of you will, indeed as I hope all of you will, as prominent members of the Pharmaceutical Society, not to speak of other societies, social and political, you will never regret having learned the art of expressing your thoughts fluently and concisely. I know of no greater acquirement for influencing men and leading men than that of being able to express your opinions in elegant, powerful, finished sentences, and depend upon it this is a power which is never, or which is at least but seldom acquired on the inspiration of a moment. It is generally the result of long, painful experiences, but were these experiences ever so painful to you I would still advise you to go through them.

Turning now for a minute or two to one or two points of a personal character; but let me here once say that although they are intended for personal application they will none the less reflect their influence upon your Association. Let me press upon you first of all the necessity for constant and intelligent observation and reflection. You remember the words which John Brown put into the lips of the painter when he was asked how he mixed his paints, "With brains, sir." Well, I know of no single operation which you can perform or substance which you can handle where the brains are not required. To cultivate the habit of observation and reflection I put in the very forefront of our self-education. I say self-education purposely, because we may read books and attend lectures, and spend any amount of time and money in acquiring education, and yet fail miserably if we have not cultivated this habit. I press this the more strongly upon you, as I find after long experience that it is the weakest point in the education as it also is in the examination of our young men.

Probably as many young students fail when they enter the examination room through the want of cultivating these habits as from any other cause. Now these gifts of observation and reflection can no more be acquired by inspiration than others of which I have already spoken. It must be a daily, yes even an hourly habit with us, and we can best cultivate them by examining into and noting the why and wherefore of every combination, reaction and test given in the text books, as well as the changes and reactions which occur in our everyday experience.

No reaction or unexpected change in any mixture or compound should ever be passed over without a note being taken of it and afterwards examined, and in this way the reflective faculty would not only be cultivated, but the foundation would be laid for many a fresh and interesting paper for your Association. You may probably think that I am making too much of this point, but I tell you as a matter of fact that it is one of the weakest spots in every candidate who enters the examination rooms.

How many hundreds, I might even say thousands of cases I could give you from my own personal ex-

perience. I would not for the world hurt the susceptibilities of any young man presenting himself for examination, and therefore my remarks here must be considered very general indeed, but I would like to give you one or two cases in point, and they are so common that no one can possibly take offence. How few, for example, have any knowledge of crystallography, so as at once to identify such well-defined crystals as borax, alum, tartaric acid, citric acid, iodide of potassium, chlorate of potassium and twenty others which I might mention, from their external physical characteristics. And yet this should be as much a part of your training as distinguishing a false from a true aconite root, or in fact the detection of any substance in the materia medica. It is by the eye that we detect the very commonest chemical reaction, and we trust the eye in these operations in every case, and therefore why not in the very decided and characteristic physical characters of many crystals, thus saving time and trouble and often very many regrets, by going straight for the substance which a primary inspection has all but decided. Again, I should say that about one-half of the young men when testing begin with the flame test. Probably they are taught to do this to discover the sodium, potassium, or lithium flame, but in doing this the great majority will fail to detect the other significant reactions which are going on. The charring, the volatilizing, the deflagration, the colour changes in many non-volatile salts and other reactions, are entirely ignored, simply by reason of their not being mentioned in the charts. It is by the chart they go, and by the chart they strictly abide, and so they flounder on, probably in the end failing to find what they should have discovered in the very initial process of their investigation.

Again, I am not in the least exaggerating when I say that the fact has almost become notorious that scarcely a young man who presents himself for examination has even an elementary knowledge of physics. It has become a common question with the government visitor at our examinations (Sir Douglas MacLagan), "Have you come across that candidate yet who knows his physics, for if you do I want to see him." He is certainly a "rara avis." No doubt the lack in this department is due to a very great extent to our educational system, and I would therefore not be too hard on this subject, but surely the construction and principle upon which the barometer, thermometer, and specific gravity bottle operates, should at least be understood by every candidate, seeing these enter so largely into all our operations.

Turning now to another point still: I believe in young men having a hobby, at least so long as it is an honest going, thorough hobby. Of course, we should all endeavour theoretically to be all round men, but even then all round men have their angularities, and I daresay we like them all the better because of these angularities, as it makes them all the more human by giving them individuality. Now I believe in hobbies for several reasons; I believe in them because I know that if a young man has a hobby he will almost excel in that subject or department above his fellows. I believe in them because I believe in the truth of "Old Watts'" hymn,

> "That Satan finds some mischief still
> For idle hands to do."

I believe in them above all, as from my life experience I can testify that not a young man who has devoted his whole energy to any department of study or investigation has ever gone wrong or failed in the battle of life. It is one of the saddest thoughts of my life to find when I look around me how many who began life with me have fallen down, down, down, even to an early grave, simply through the want of some absorbing influence which could carry them out of their grosser nature. Now I find, unfortunately, that you have no great facilities in Dundee for prosecuting your studies. You have a college of which you well may be proud, but as far as I can learn it gives you no direct facilities for studies which would be specially useful to you. The more needful, therefore, for you to have a meeting place of your own, and no education next to that of special training is equal to that obtained in such associations as yours now formed.

One man's hobby is materia medica, another's is pharmacy, another's chemistry, while a fourth may think that botany excels all subjects. Let such young men who excel in departments step into the breach and take the lead, and soon they will be looked up to as authorities, and thus an educating process will go on second only in importance to that of a well trained class. I knew a young lad, a dull, obtuse looking youth whose hobby was—well, I daresay you would never guess what it was—it was *snakes*.

You should have seen how the face of that lad brightened up when his favourite subject was touched upon. It literally glowed with enthusiasm as he told you the history of every snake in his possession and its habits, and when I met him I was never sure but that he would produce a snake out of each pocket of his trousers to gratify me. Depend upon it that lad was a born naturalist, and I could not help respecting him from the simple fact that he knew so much more than I did on his special hobby. Closely connected with this is another point, and this is probably a hobby of mine. Your assistants and apprentices have not as a rule much money to come and go upon, but what they really have they are very apt to part with, and what they do part with is very much better to be diverted into a proper channel. Well I know of no better channel, or to put it in other words, I know of no better investment than books. Good books of every kind, but especially books of reference, are about the safest investment, next to the national savings bank, which young men can make. Satan finds a lot of mischief not only for idle hands but for too full purses also; and I can scarcely believe that a well filled bookcase and an empty purse are in any way compatible with the theatre, bar saloon, or other grovelling amusements of that kind. I remember the time when, possibly like some of you young men before me to-night, I had to look at both sides of a shilling before parting with it, and yet few pleasures have been so keen in my life as that when I first invested in a few works of reference. Not one of these books, I can safely say, but what has literally returned me forty and even a hundredfold, while no one can tell from what temptations I have been kept both by the companionship which they gave me and the empty purse which they occasioned me.

Again, I daresay you will be wondering why I dwell upon a point so minute, but I know that life histories appeal to young men, and while I have been in the midst of these notes, several incidents have occurred which have impressed me exceedingly, and now they naturally flow from the point of my pen. Being in Newcastle lately, I took the opportunity of seeing through one of the largest chemical works on the Tyne, and I can assure you that my first impression was one of deep depression at the littleness of everything pharmaceutical.

All the operations were conducted on so large a scale that they sunk into perfect insignificance our petty operations.

Here were hundreds of tons of carbonate of soda in process of crystallization; in another department so many tons of lime in process of chlorination, while hydrochloric acid was flowing constantly night and day in a large stream to the reservoir, and yet the utmost order, purity and precision prevailed over the whole. Passing, for example, the chlorinating cham-

bers, which were numerous and large, I could not help remarking that there was not the faintest smell of free chlorine, and on going into all the different departments I noticed also various large test-tubes attached to chambers in the chimney walls, through which the different gases passing up the chimney might pass and thus waste be detected and checked. I remarked upon these features to the chemist who was conducting us through the works, and his reply was very significant. He said when a company can pay dividends to the extent of 15 or 20 per cent. to its shareholders it does not require to be careful of waste, but when dividends fall to 3 or 5 per cent. it is the waste that pays. Now I have often thought of this remark within the last few days. It is the waste in all our lives that pays in the end; the waste moments, the waste pence, the waste strength, and books of reference in many of our difficulties will help us and save many an hour's, and even many a day's investigation, besides helping us on in other directions. There are not many lives which yield a dividend of 15 or 20 per cent.; they are all made up of small details, and in the end these small details pay, and so with these reflections I came back to pharmaceutical life once more, comforted. My reminiscences of this visit, however, would not be complete did I not add one more fact, and one, too, which bears very directly on the points which I am now touching upon, and which bears still more on the possibilities of every young man now before me.

The chemist who conducted us through the whole works, who is now one of the managing partners in the concern, who has eight or ten chemists under him and some seventy or eighty different foremen of departments to look after, was once a chemist and druggist's assistant. He came to Edinburgh as a turnover apprentice and was asked the composition of hydrochloric acid, and knowing nothing at all about it, his ignorance cost him *that* situation. In fact he knew nothing of chemistry whatever, but his very ignorance spurred him on to gain all the knowledge he could, first from books, for he could not then afford lectures, but afterwards from lectures, and now he fully ascribes all his success in life to these three things, viz.:—

1st. His pharmaceutical training, which taught him the beauty and necessity of minute attention to manipulation. 2nd. His books, which gave him his first start in chemical training. 3rd. The lectures which gave him his finished training.

Now that I have touched upon books, let me just say one word upon education. I have no intention of entering upon the proposed curriculum scheme. I think it might well form a subject for a good debate at one of the evening meetings of your Association, and of this I am quite assured, namely, that after you have thoroughly thrashed the whole subject out you will be astonished to find how much can be said for it as well as against it.

This, however, I may say, that while the "old Adam" rises up very much against the "Thou shalt" and the "Thou shalt not" of a curriculum scheme, as indeed it does against every command, there is more in the words "Thou shalt" than in any other new feature which the proposed curriculum imposes.

After examining a young man I often ask him, Have you attended any classes? You will quite understand that I am careful never to put such a question or indeed any question to him previous to examination, so as to avoid the slightest appearance of being influenced by any external consideration. Well, in nine cases out of ten, I might almost say nineteen out of twenty, the reply is, "Yes, we have attended so-and-so's classes." With this experience the conviction is forced in upon me that every one of these young men would have been better trained, and probably also more cheaply trained, had they attended a well defined and recognized course of pharmaceutical education. Notice this, that at the present time pharmaceutical education, strictly speaking, is to a great extent in chaos. There is no defined course of study, no special classes, if we except some of the larger centres, where, in the majority of cases, the teaching follows the line of examination instead of the reverse. A curriculum would therefore do this good, it would define and definitely fix the course and limit of your studies, and thus concentrate your energies and your means likewise. Education under any circumstances is good, but well directed and systematic education is in every way much better. One word here to any masters present. Encourage your young men and give them every opportunity for study. I know from personal experience that it is next to impossible to personally supervise these studies, and yet much can be done in the way of directing and guiding them. By doing this rest assured we get better services, more intelligent service, and heartier service, while at the same time we are advancing the true cause of pharmacy. I always feel proud of my calling, and with years this feeling only increases. I would like to infuse some of this enthusiasm into you young men. I believe that next to the clerical and medical, pharmacy takes the place in representing and carrying out the purposes designed for the good of our fellow men, and if this idea of its high vocation once permeates our whole being depend upon it the feeling will ooze out at our very finger points. When I think of all this I look upon stores and cutting shops with comparative indifference, mere incidents in the history of pharmacy, accentuating only its progress and probably also helping it to rise to something higher.

Pounds, shillings and pence tend no more to constitute the true existence of pharmacy than does the abundance of what we shall eat and what we shall drink constitute the true existence of man. No; there is something higher and nobler than this in pharmacy, and we need never fear failure so long as we continue in the future as in the past to infuse our whole life's power and influence and intelligence into our work, ever keeping in mind that

> "Whether doing, suffering, or forbearing,
> We can do much by persevering."

The address throughout was attentively listened to, and very frequently applauded, and on Mr. Gilmour taking his seat he received a hearty round of applause.

The Chairman then said that before proceeding with the votes of thanks he would call on Mr. J. Rutherford Hill to address the meeting.

Mr. Hill, who on rising was greeted with applause, expressed the pleasure he felt at being present on such an auspicious occasion. He had to congratulate the assistants and apprentices of Dundee on the commencement they had made, and compliment them on the energy and pluck they had displayed in bringing their Association to its present condition. At the same time he warned them that there must be no drones in such a Society as this, that all must be active. While he was in entire sympathy with the movement for shorter hours he would also offer a word of warning. The Association, he thought, should not set this before it as part of its work as an Association. He had found by experience that the adoption of such a course is a mistake. It is a common complaint with young men who wish to study that their hours are far too long, but while he had no desire to damp in the slightest degree the enthusiasm of that evening, he would say that it was perfectly possible to study and pass in spite of long hours. If we look over the page of history we find that it has not been the men who have had the shortest hours who have made their mark. It is those who have triumphed over adverse circumstances such

as these. He strongly advocated the system, and endorsed the opinion of Mr. Gilmour, of inviting short papers by their members. He had found it a most successful idea, and he had found from experience that it was the most practical and educative method. He earnestly recommended all to keep before them these three great points—observe—record—report—observe the common occurrences, record them, and report to the Association. He could not help expressing with all his heart his cordial sympathy with the Association, and he earnestly hoped that it might go on and increase, that everyone would put his shoulder to the wheel, and then they would see the result in the days to come.

Mr. D. McD. Skinner (Vice-President), having been called upon by the Chairman, said that in the absence of their President, Mr. John Forsyth, he had a very pleasant duty to perform, and that was to ask them to accord a very hearty vote of thanks to Mr. Gilmour for the excellent address he had given them. In the course of his remarks he said that Mr. Gilmour had proved himself on this, as on all other occasions, the true friend of the chemist's assistant and apprentice, and that by acting up to the suggestions and advice given that night this was sure to be a successful Association, and it would always be a pleasure to look back and remember who it was that delivered the Inaugural Address.

Mr. Gilmour, in acknowledging the compliment, said he had just to express the great pleasure it afforded him at being present, and hoped the Association would go on and prosper.

Mr. T. C. Henderson then asked the meeting to accord a like compliment to all who had come forward and given the Association financial aid. In doing so he said that in a great measure the success of their Association depended on the funds. The lack of an Association had long been felt in Dundee, and when at last it was formed they saw that to carry on the movement successfully they must obtain rooms of their own. To do this it was decided to appeal to the local chemists, and also the wholesale firms doing business in Dundee. That appeal had met with success, and as an Association they were much indebted to all who had subscribed to their funds.

Mr. Charles Kerr and Mr. Frank W. Young having spoken,

Mr. Jno. W. Russell moved a vote of thanks to Mr. Hill for his address, and Mr. Robert Lindsay did the same to Mr. Doig, for the admirable way he had occupied the chair.

Both gentlemen having replied, the meeting, which all through was a complete success, then terminated.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The Inaugural Meeting of the fifth session of the School of Pharmacy in connection with the above Association, was held on Thursday evening in the new rooms, New Surrey Street, Sheffield. The chair was taken at half-past seven o'clock by the President, Mr. A. R. Fox, who after a few suitable words of introduction called upon Mr. S. R. Atkins, of Salisbury, who delivered the following—

Inaugural Sessional Address.

Gentlemen,—In addressing you this evening I am fully conscious of the disadvantage under which I labour in following a succession of distinguished pharmacists who have so exhaustively reaped the field of educational and technical inquiry as to leave but the gleanings of the harvest for myself.

On the other hand, I am not unmindful of the fact that I speak to a large extent to a new set of men, and that it sometimes happens that old truths receive a new setting from a fresh speaker.

Let me at once say how thoroughly I appreciate the honour of being thus invited to speak to you gentlemen and students of the Sheffield School of Pharmacy, and how solicitous I am that something uttered to-night may prove an incentive to vigorous, sustained study, and assist towards the formation of a decision on the part of some hesitating youth, not merely to devote a life to pharmaceutical labour, but also to resolve that success shall be deserved, and, if possible, achieved.

Believe me when I say it that I have an intense sympathy with you. I cannot but regard you, with your bright, hopeful temperaments, with all the capabilities and possibilities of your future, with a strong desire that your career may be alike honourable and useful.

"Oh, Life! how pleasant is thy morning,
Young Fancy's rays the hills adorning."

Looking at the position you occupy in this year 1889, the vantage ground held by you as students in this School, I cannot but congratulate you most heartily as I contrast it with the corresponding period of my own life. At that time there was no pharmaceutical literature worthy the name; the standard works on chemistry were fast becoming antiquated in face of new discoveries and new modes of teaching. The School at Bloomsbury Square, recently established, was slowly fighting its way to recognition, despite the active antagonism of some and the supineness of others, but its influence on technical education in the country was practically nil.

The chemist of that day failed, except in rare and highly honourable instances, to realize his responsibilities to his apprentices. Few books, little apparatus, and that of an antediluvian type, small encouragement to study, less guidance, and no definite or adequate time allowed for it—such were the average environments of the average druggist of the period referred to.

Do not, however, let me be unjust. I am not wholly complaining of those days. In the process of necessary evolution they answered their purpose, and have given place to others in some, though not all, respects better.

We were happy enough in our blissful ignorance; we worked, I think, harder, longer, I am quite sure, than the young men of to-day, but it was mainly manual, not mental labour.

Our incapacity to pass an examination was not revealed, for the needful, but painful test had not yet been invented, certainly had not been applied.

That the voluntary system of education and examination was not wholly inoperative for good is proved by the number of competent,—aye, let me gladly add,—distinguished pharmacists, traceable to the particular epoch indicated, which I venture to describe as the very "Renaissance of Pharmacy," many of whom survive to this present day, and to whom we confidently look as the vanguard of progress. Some of these men were recently with us at Newcastle; others would have been gladly welcomed there; mentioning names were alike invidious and superfluous.

But in addition to these men, whose names are not likely to perish, enshrined as they are in our archives, there are many others who have passed away and left no widely-known record of their life, but I assure you it is worth searching after and finding.

In every part of the country there have been, and still are, men of rich culture, wide and varied reading, highest probity, possessing the confidence and esteem of the society in which they mingled. I often recall the memories of pleasant surprises in my ramblings of

past years, here and there, as I have come across such choice spirits, and wished I could have introduced them to the wider fraternity of pharmacists.

It is only half the truth, and that the lesser half, to say with Gray,

"Full many a flower, etc;"

the whole rounded truth lies in a true life wherever lived.

Compared, however, with the men to whom I have thus briefly referred, your position as students in Sheffield is one of distinguished privilege; let us for a moment consider it. That there are special and peculiar difficulties in your path a prior generation was unacquainted with, I readily admit, but coming as they will, after your direct student life is over, I need not dwell on them at length.

You will be called on to encounter a competition, not simply of labour and capital, but of brains, that will probably intensify as population becomes denser. For that competition in the race you are now training, and what I wish specially to emphasize is the fact that in the facilities for adequate and efficient training now within your reach, energetically seized, lies, other things being equal, the result you desire—success.

I assume that you have commenced with the priceless boon of a sound liberal education at school, which you have wisely availed; that you have already passed the Preliminary examination of the Pharmaceutical Society of Great Britain, or its equivalent; that you have now deliberately chosen the trade of a pharmacist, or the profession of pharmacy, call it which you like; that in the various establishments of this great manufacturing town, you are acquiring a practical knowledge of the details of your business behind the counter and in the laboratory, and that you have entered this School to acquire a knowledge of those varied subjects on which the science or art of your craft is built, and the quality and quantity of which knowledge will bye and bye be tested in the examination room.

I congratulate the successful students on the good use they have made of their advantages. I congratulate every man who has honestly worked here, whether a prize winner or not. The syllabus of study is an admirable one, its measured proportions of theoretical and practical instruction are most judicious, the inadequately remunerated self-sacrificing service of the teaching staff beyond all praise.

If I were to indulge in any apprehensions for the future of your School, it would be that you cannot expect a perennial supply of such instruction on such terms.

Another fact in your history as a School is its rapid growth, the surprising increase in the number of students, the high percentage of attendances, and as a result the substantial character of the work that has been done here.

I speak subject to correction, but I believe I am correct in saying that your School is independent of the famous institution of Sheffield, the Firth College. Unconsciously I may be treading on delicate ground, but I venture to utter the conviction that it would be a good thing for this School to be in affiliated relations with Firth College. I watch with deepest interest the marvellous growth of the great universities and colleges in various parts of the kingdom. Newcastle, Nottingham, Liverpool, Leeds, Manchester, Hull, Sheffield, Bristol and other important towns are the first-fruits of a harvest destined to scatter sound educational influence over the entire country.

If at present you are not indebted to your distinguished benefactor, Mr. Firth, for any portion of your technical instruction, you have the excellent college in Sheffield, with its broad basis of higher instruction in the wide area of belle-lettres, available by you, according to your taste and opportunity.

Provincial education, or, to speak more correctly, pharmaceutical education in the provinces, is a theme on which much has been written and said, and on which a great deal more remains to be uttered.

For the most part, the experiments have been lamentable failures. Schools have been started, libraries and museums formed, lecturers and teachers engaged, local subscriptions collected, the whole subsidized by grants from head quarters, with results I forbear to describe in detail, the evident reason for such disappointing failures being the inversion of the proper order of procedure, furnishing the supply before the demand existed, or indeed the possibility of its existence, save in rare personal instances.

The endeavour to meet the needs of these rare instances of innate love of study is a commercial failure, and to a certain degree may be deemed superfluous. Such men would triumph over any difficulty, indeed make the very difficulty itself a stepping-stone to success. Such men do voluntarily what most attempt only under pressure, hence my strong conviction that a prolonged curriculum enforced is indispensable for our young men.

I have at considerable length elsewhere argued on this matter; I may in a sentence now say that a careful and sustained consideration of the results of the examinations at Bloomsbury Square has convinced my judgment.

I am quite aware that I am open to the reply that the description I have given of the former condition of pharmacy in Great Britain goes to show that the voluntary system of education was not a failure.

To that argument I venture the rejoinder that the voluntary system of education harmonized with the voluntary system of examination.

But all that is changed.

Let us, however, suppose that the crusade recently commenced against examinations was successful, I would still urge the importance of compulsory training for its own sake, under the changed conditions of commercial and professional life. The brain fight of the age is not slackening and will not.

The standard of intellectual attainment is being raised all round; pre-eminently true of our learned professions, it is also relatively true of a craft like our own, standing in close proximity to one of these professions.

The *future of pharmacy* is a matter of anxiety to many persons and of speculation to others. I do not share the fears of the fearful if only we are found true to ourselves, but I repeat and emphasize the conviction I have in another place expressed that our numbers will suffer diminution. A process of natural selection will prevail, chemists and druggists will dissolve partnership; the former to practice pharmacy with a higher recognized status than he now enjoys, the latter (the druggist) with a lower qualification, and, it may be, a limited licence, supplying more as a drysalter the varied requirements of society.

Such a division of labour, such a differentiation of talent, does not necessarily need legislation to effect the severance, it is rapidly progressing to-day in a revolution more or less pregnant with consequences because so silent.

To-night we are concerned only with the first of these two classes, and as students I regard you as its representatives. If in the period of your school life you had the advantage of receiving at the same time some amount of scientific and technical instruction, so much the better; just to that extent has time been saved, and the foundation laid for the specific work you are now doing.

I have long thought that the elementary education of this country should be partly book and partly industrial or manual. Just so should the education of the middle classes be jointly literary and technical.

I would ask you still to preserve this combination,

though it may be necessary for a time to invert the proportions of these two sides of your educational career, and there can be no serious difficulty in the way with the facilities afforded alike by this School and by the Firth College.

This leads me, in passing, to offer a remark on the process of decentralization now going on. I have referred to it in connection with the development of provincial Universities and their affiliated Colleges. I think as time goes on it will become true of provincial schools of pharmacy, such schools furnishing the full course of instruction required for our examinations, constituting recognized centres where the examination should be conducted by a peripatetic examining board, with possibly—but on this point I hesitate to express a definite opinion—a provincial mint with power to impress the hall mark of efficiency when acquired.

London has grown and is growing to dimensions utterly baffling all earlier forecasts as to population and area. What may be the future growth of our mighty capital it would be idle to speculate upon.

The very greatness of our empire and the corresponding magnitude of its chief city are strengthening the demand for decentralization, a principle which applied to the matter now under our consideration gives a dignity and importance to such schools as the one I am now addressing.

In order that you may be enabled to utilize to their full extent the courses of instruction now within your reach permit me to offer you one or two suggestions.

In the first place I would express the hope that you have a *definite aim in life*, and that to be an educated and in its best sense a successful pharmacist.

Pray do not misunderstand me.

I do not say on the one hand that this should be your sole or highest aim ; it is not for me this evening to invade the domain of our highest form of life, my own convictions on this subject are deep and strong. Nor do I affirm that even this constitutes the entire sphere of human life. Be grave and gay as occasion demands, laugh as heartily as you like, only at the right time and the thing worth laughing at. Body and soul have each their claims which must not be neglected, but I have not come to Sheffield specially to remind you of these, but the rather to press you to win your way into the foremost rank of pharmacy, for it is no contradiction to assert that in the front rank you will find more breathing space—the greatest crush will always and increasingly be with the rank and file.

I press this sense of ambition on you, not simply for your own sakes—the substantial rewards of reputation are wealth—but for its relative value to others. We are members of a guild or craft called on to contribute something to the general good, and if possible contribute the lustre of an honourable career in the world of pharmacy.

The ideas of *individualism* and *confederate action*, although seemingly divorced, are not really so; the best work in the world is accomplished by the former, the association and combination of individual workers essential to large results in society. It was a profound saying of an Eastern philosopher, "Progress is attained by the perfection of the individual."

"Prospiciens et Respiciens" is a sentiment covering the entire field of human energy. Yours is the former attitude. An aimless life is a useless one. It is said of Lancaster, the celebrated educational reformer, that he not merely gave prizes to successful scholars, but that he had them constantly suspended before their eyes as incentives.

Napoleon at St. Helena was an exile in whom the fire of ambition had burnt down to a few bitter ashes of disappointed hopes, and he said, "I can now live only in the past." Macaulay tells us in graphic language how young Warren Hastings resolved to buy back the estate of his ancestors, and how he kept his word; and you remember that Charles Dickens, struggling with limited means, fixed his heart on one day settling in the mansion at Gadshill—and did it.

Concentration of effort on the thing in hand is another suggestion I venture to offer. This is not easy, but most essential; strenuously let me insist upon it. I know from personal experience how difficult it is to train the mind to this habit of concentration, but nothing really becomes your own until this is achieved. The powers of acquisition and assimilation work then at their full bent, and can be turned off and on to other fields of inquiry with delightful ease. Just as in certain kinds of athletic exercises different sets of muscles are brought into play, you acquire definiteness and depth of mental impression just in the measure of your fixedness of thought.

You will readily remember in your readings in English literature the names of celebrated men noted for this faculty. My valued friend, the late Henry Fawcett, told me that to this habit of mental concentration he owed the facility with which he could seize and retain mental impressions.

You know how he could fix the attention of the House of Commons, whilst at extraordinary length he would marshall figures and facts he only heard of, but never saw, and elaborate his views on Indian politics and finance.

The great Napoleon had this quality of attention in perfection without allowing it to run into ridiculous abstraction. "My mind," he said, "is like a chest of drawers. When I have done with one subject, I shut it up. Thus I have no confusion of ideas."

George Stephenson and Hugh Miller as working men are noted examples of the same faculty.

Another remark I may offer is one affecting the practical side of your student life, and it is this—cultivate the habits of *observation* and *independent reflection.*

Behind the dispensing counter and in the laboratory you will be constantly observing phenomena of the greatest interest and importance. Let not one of these pass unchallenged as to its meaning. Some will be familiar, and so will be the explanation; others will give rise to thought as to the why and wherefore.

Necessarily, you will not always be able either to inquire or reflect at the moment; carry your note book in your pocket and make use of it; in other words chew the cud at your leisure.

The text book will come to your aid for the most part, for the path you tread has been well worn by previous travellers; none the less do not accept the explanation without independent proof.

I do not agree with Carlyle's cynical estimate of the intelligence of the population of the British Isles, but I do believe that the habit of real earnest independent thought is a rare one.

How enriched your life will be with a mind replete with facts and accustomed to reflect upon them.

How full of significance the world around you, ever suggesting, ever stimulating inquiry, how dignified your work, though done in a humble sphere, and to a large extent how superior it will ultimately place you to the chafing influence of little cares. Pray do not imagine that I am in the realm of metaphysics or poetry in thus talking to you. I am speaking as a man of the world, who in early life had not your scientific advantages, who knew in the first years of his business career what working and waiting for results meant, but who found in the intellectual pursuits to which reference has been made a fascination I fain would have you conscious of.

I have pressed upon your consideration as students the habits of *definiteness of purpose*, *concentration of thought*, associated in the practical arena of your daily life with *observation* and *reflection.*

By-and-by, and all too soon, the training will have ended and the real earnest work of life will begin.

"There is a Providence that shapes our ends
Rough-hew them how we may."

In various parts of this or it may be of other lands, you will become, I trust, the men of light and leading, and whilst authorities in your special pursuits, you will need other and more varied furnishing to make you the all-round men with whom we like to mingle. The vast, practically limitless worlds of mind and matter lie before you; try to cultivate an acquaintance with some portions of them. You have, I hope, a love of books; foster diligently this love of reading.

Sir John Herschell says, "that if he were to crave a taste which should stand by him under every variety of circumstances, and be a source of cheerfulness to him at all time, that taste shall be reading."

But for relaxation you will need your "hobby." I shall not attempt to choose for you; the field of choice is ample and varied, but simply ask you to excel in the recreation, as well as in the work of life.

You are, I hope, as apprentices or students, already connected with the Pharmaceutical Society of Great Britain. May that connection continue and your attachment to that important institution grow.

I do not ask for gratitude for what it has already done for your School, and, I believe, is prepared yet to do for it. In passing, I can assure you that the Council of our Society watches with keen interest the experiment of provincial education being worked out in this town, and I know is prepared to back its sympathy with further pecuniary assistance when it sees, as I do this evening, a large and continuous supply of students, and the liberal support of the School by local pharmacists.

But I base my appeal for your sympathy and support of the Pharmaceutical Society in the after years of your life, because I think it deserves it, and, I regretfully add, needs it.

It is an Institution much misunderstood and even more abused. I hold no brief from headquarters. I am prepared to admit that we make mistakes and will accept my individual share of responsibility for them; at the same time I declare my strong conviction that the Society deserves the confidence of the trade, and that nothing can be more suicidal than for chemists to stand outside it, or being inside, hinder its usefulness by traducing it.

The confidence of the public, of the medical profession, of the Government departments of the State, and absolutely and completely of foreign countries, are alike the results of higher education and a keener sense of our responsibility to the State. That we may have been somewhat tardy and conservative in the exercise of existing powers or the acquisition of fresh ones, I will not deny, but a long and close official connection with the Council at 17, Bloomsbury Square, warrants me in saying that the charge of indifference to trade interests is not true.

How, then, can we explain the palpable fact of widespread unpopularity? The answer, I think, is twofold. In the first place we are an examining body, and with the disastrously large percentage of failures in the examination room we incur the dislike of the unsuccessful.

The enforcement of the penal clauses of our Acts of Parliament alienates many others. But by far the most potent source of estrangement lies in the fierce competition which chemists have to encounter, much of it unfairly, I admit, but which for the most part cannot be touched by legislation.

It would not be difficult to write a prescription for many of the ills which afflict us, but I know not the pharmacy where I could get it dispensed. Certainly the House of Commons, with its tardy and limping legislation, is not of much service to us.

The remedy is that the old days, the good old days, should revisit us, when we had plenty to do, and were well paid for doing it; when stores, bogus drug companies, cutting chemists were not dreamed of.

"Could those days but come again," all would be well. But they cannot, and we must accommodate ourselves to the altered aspect of affairs.

As students you are doing so by better scientific training for life, and I trust an impartial recognition of the Pharmaceutical Society in your sympathy and support when you are in a position to render them.

Let this thought be your future inspiration—

"He lives most
Who thinks most, feels the noblest, acts the best."

At the conclusion of the address, Mr. Atkins proceeded to distribute the prizes to the successful students of the previous session, accompanying each presentation with suitable words of encouragement and advice. The names of the prize winners will be found on p. 259 of a previous number of this Journal.

A vote of thanks to Mr. Atkins, proposed by Mr. Learoyd, seconded by Mr. Bradwall, and supported by Mr. Ward, was carried by acclamation.

It is pleasant to be able to add that the Society's new rooms appear excellently well adapted to the educational purposes for which they are intended and are especially well fitted up.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

The session 1889–90 of the Midland Counties Chemists' Association was opened at the Midland Hotel, New Street, Birmingham, on Tuesday by a Conversazione, at which the President (Mr. W. F. Wyley) delivered an inaugural address. There was a large attendance including many ladies. Several letters of apology for non-attendance were read.

Professor Tilden proposed a vote of thanks to the President for his interesting and instructive address. He said reference had been made in that address to the conditions under which apprentices studied their business as pharmacists. Notwithstanding the reforms which have been effected in the matter of education, there were still very many schools in which such subjects as chemistry, physics, natural history and other sciences were not taught. If they were taught, however, a youth leaving school, say, at seventeen years of age, would have the foundation laid of the principles of chemistry, and then he would have a better opportunity of applying those principles to his business as a pharmacist. Then employers, instead of taking apprentices, should look upon them as pupils as well as assistants, and a due proportion of time should be allotted for study. It was unreasonable to expect young men who had been hard at work all day to devote the whole of their leisure to the study of that interesting volume, the Pharmacopœia. As to the price of goods, he thought that might be regulated to some extent by pharmacists charging a fee for their skill as pharmacists. Medical men charged for their skill, and he did not see why pharmacists should not do the same, and then add the cost of the drug. The public would soon become educated to the system, which would eventually give satisfaction all round.

Mr. A. Southall seconded the proposition, and spoke of the desirability of more support being given to the Pharmaceutical Society. It was complained that the Society did not give sufficient attention to trade matters, but if chemists as a body supported the organization they could make it what they thought proper.

The motion was agreed to, and the President briefly replied.

A vocal and instrumental entertainment followed.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.
SECOND DAY'S PROCEEDINGS.

Wednesday, September 11.

(*Continued from page* 280.)

The next paper read was entitled :—

Negative Evidence of Lead in Drinking Water.

BY R. REYNOLDS, F.I.C., F.C.S.

At the outset, I will disclaim the possession of any new discovery with reference to the action of drinking water upon lead. But, there are cases in which no new discovery can be announced, where the importance of the subject, as affecting the public welfare, may have enormously increased. It seems to me that the question of the contamination of drinking water by lead is one of these, and I trust that this enhanced importance will justify the present communication.

In the West Riding of Yorkshire it has been found, during the past few years, that the public water supplies of some very important towns are capable of acting energetically upon lead, and the almost universal employment of lead for service pipes places vast populations under conditions of much peril. The water supplies of Sheffield, Bradford, Huddersfield and Keighley may be specially named as having furnished many cases of lead poisoning. The neighbouring county, Lancashire, can supply similar illustrations.

The general principles upon which these water supplies have been selected have been the endeavour to secure water beyond the suspicion of contamination by impurities of human origin, or from agricultural land, combined with the possession of the smallest possible amount of solid matter. The example of Glāsgow in taking the soft water of Loch Katrine has been emulated, as a standard to be aimed at in the interest of economy of soap and for the advantage of various manufactures. The absence of organic impurity might have been secured by taking the supplies from springs where these furnished an adequate volume, but the combined conditions of organic purity and softness were found only in waters gathered in high moorland districts. These waters are now recognized as frequently having acid qualities, which cause them to attack lead.

The literature of the subject is now indicating that its practical importance is realized, and during the past few months some valuable papers and reports of discussions have been published. Amongst these are a paper "On the Action of Water on Lead," by Professor Percy F. Frankland, Ph.D., etc., read before the Society of Chemical Industry, April 1, 1889, whilst the discussion which followed its reading brought out valuable facts and opinions from Mr. A. H. Allen, of Sheffield, whose knowledge of the subject is exceptionally comprehensive. At the meeting of the British Medical Association in Leeds, August, 1889, Dr. Sinclair White, lecturer on state medicine, etc., Sheffield Medical School, gave a valuable paper on the subject, with notices of the experiments made by Mr. Allen. It is clearly established that the new factor in such waters is a free acid. They are appreciably acid to litmus paper, and concentration of the water increases the acidity. Water found stagnant in pools on the surface of peat has the maximum degree of acidity.

We yet await the isolation and determination of the exact nature of this acid, inorganic or organic. The belief that it is sulphuric acid, derived from decomposed iron pyrites, is giving way to its reference to peat as a more probable source. The maximum amount reported at Sheffield was the equivalent of 0·7 grain of sulphuric acid per gallon.

It is not within the province of the present paper to discuss the various remedies proposed, such as the introduction into the water of silica, by Messrs. Crookes, Odling and Tidy; carbonate of soda, by Professor Percy F. Frankland; or lime or limestone by other authorities. Of these remedies, limestone has already rendered good service, although there is difficulty in keeping it in a perpetually active condition. The introduction of relatively small proportions of harder spring-water, containing much lime, is another expedient that has been recommended. Temporary protective measures within the power of the consumer consist in the adoption of almost any description of water-filter. Even a flower-pot, filled with wood-charcoal, has made an efficient filter. Of course, such measures are palliatives only, and not to be recommended as remedies.

My present object is to point out that the report of a chemical analyst on the presence or absence of lead in any particular sample of water should be so guarded that the public may not accept it, to their own detriment, in a more general sense than is justifiable. In the paper by Dr. Sinclair White, already referred to, it was pointed out that the size, age and purity of the lead-piping employed, the length of time the water remained in contact with the lead, the pressure, temperature and admixture of air, had each more or less influence in determining the amount of lead dissolved. As all these factors are subject to variations, it is clear that the results of an analysis when their minimum influence was being exerted might have no relation to the results when more energetic or more prolonged action occurred.

Let me illustrate this by the case of a series of samples of water from one of the supplies already alluded to which passed through my hands. The following quantitative results are those found by Professor Attfield, F.R.S., etc.

		Grains of lead per gallon.
	Source A.	
Sample drawn	7 a.m.	0·35
,,	10 a.m.	0·10
,,	3 p.m.	0·10
Filtered water		0·00
	Source B.	
Sample drawn	6·30 a.m.	0·15
,,	9·0 a.m.	0·05

Special vigilance should be shown in the case of hot water supplies, as these have often been found contaminated by lead where the cold water was free from it. The bad habit, too common amongst servants, of filling tea-kettles from hot water cisterns, has, in several instances that have come under my observation, been productive of much injury to health. Again, there are the cases where varying amounts of the scale or coating which forms a protective covering to the inner surface of the lead-piping, are detached and suspended in the water, although no lead is found in solution. Such a case is before me now.

The moral which seems justified by the present position of the subject is, that an analyst reporting on the presence or absence of lead in drinking water ought to make it plain to his client that he speaks only of the sample placed before him, and if that sample has not been taken under the conditions most favourable to the presence of a maximum amount of lead, the analysis and report may have failed in their object. In the case of a commercial analysis of some article of trade, the technically skilled client who sends it will take care that a pound sample fairly represents a ship's cargo. But the client who wishes to know if his family may safely drink any particular water has no knowledge of the technicalities affecting the reactions of lead with water in all the varying moods and tenses of the latter. I think it follows that the analyst should direct that samples ought to have been in contact with the ordinary service pipes for a fixed period, say

twenty-four hours. Where samples are delivered without the opportunity having been given for this injunction, it is desirable that a short printed statement should accompany the report, explaining the conditions which favour the action of water upon lead.

The PRESIDENT said this was a matter in which all present were very much interested, coming as they did between the public and the medical profession.

Mr. A. H. ALLEN (Sheffield) had listened with much pleasure to all Mr. Reynolds had said and agreed with him entirely. There was no doubt it was extremely important, especially as very frequently the effects of lead poisoning were very serious, though the origin of them was so obscure that the medical men did not suspect lead poisoning. Of course the report on any particular sample could only refer to that sample, and it was a great pity that the public could not be educated into a more intelligent way of selecting things to be sent to the chemist for analysis, because a great deal of their money and the chemist's time was wasted, and suspicion and doubt was occasionally thrown on the accuracy of analyses, simply because the parties had not taken the trouble to insure the proper conditions being present. There was one point not referred to by Mr. Reynolds which came very much home to him, because it occurred in his own household. Unfortunately at one time all the water which reached the inside of his house passed through a lead pipe and was contaminated. They had none uncontaminated; all they could do was to go down to the tap in the cellar, and after having let the water run for some time they could draw water containing as little as $\frac{1}{15}$th of a grain per gallon, but the other water was liable to contain as much as $\frac{3}{10}$ths, and it had been as much as one grain. This therefore became a serious matter. He had no further personal interest in it, because he cured it entirely by filtering. On that point he was not quite clear whether Mr. Reynolds said that wood charcoal or good charcoal would do, but if he said wood charcoal that was insufficient, it must necessarily be animal charcoal. The wood charcoal exercised a certain physical action in removing lead for a certain length of time, but it was the phosphates in the animal charcoal which really did the duty. The lead could be removed equally well with a bone-ash filter as with animal charcoal, and the efficiency of the charcoal could be judged of, so far as lead removing was concerned, by noticing whether the charcoal had turned white. As soon as the charcoal was saturated with phosphate of lead it became white or grey in colour, so that as long as there was a distinct portion of the charcoal still remaining black, it was still efficiently removing the lead; of course it might be desirable to change it for other reasons. That was a very important point, because it was quite clear that a filter which was not doing its duty was almost worse than none. He had put up a high-pressure filter arranged above the sink, through which the water ran in a stream as thick as a pencil absolutely free from lead. It went in with a third of a grain to the gallon and came out absolutely free. That was an animal charcoal filter, and had been at work for several years. But having taken all this trouble to remove the lead from the water, they were alarmed and troubled by finding that several members of his family still suffered from lead poisoning, and he could not for a long time fathom the mystery. At last the tea was found to contain lead. Their attention was directed to the tea leaves, which were found to be free, and ultimately the evil was traced to the kettle, which had been furred, and that fur contained a lead deposit, no doubt deposited there in the time before they knew what harm was being done. This deposit contained an enormous quantity of lead, and there was no cure for it except buying a new kettle, and he believed the ironmongers in Sheffield had made a good trade out of it. That showed how difficult it was to trace the source of lead poisoning, and how one might be thrown off the scent by finding there was no lead in the water which was being used, although there was actually death in the pot.

Mr. BRANSON (Leeds) said he had been examining the composition of water that caused a considerable epidemic at Pudsey this season, and on the authority of Professor Attfield it contained $\frac{7}{10}$ths of a grain per gallon. That water was drawn the first thing in the morning, and probably contained the maximum amount. He found the quantitative results were as follows:—The water was distinctly acid, of course. The term of acidity in sulphuric acid per gallon was ·114 grain; the total amount of sulphuric acid combined amounted to $1\frac{1}{2}$ grains, so that there was plenty of sulphate present; but in the presence of free acid the sulphate was no protection against the action on lead. There was no temporary hardness; the permanent hardness was about 4 grains, and the total solids 6·7 grains; all the other constituents normal. That water caused a serious epidemic, in a large number of cases apparently suddenly. Last week another sample of water equally interesting came under his notice. It was proposed for a town supply, and it acted freely on lead. The terms of acidity were as much as ·9 grains of sulphuric acid per gallon; the total sulphuric acid present was less than one-tenth of the total acidity.

Mr. ALLEN asked how it was ascertained.

Mr. BRANSON said by precipitation with barium. The temporary hardness was nil, nitric acid about normal, and the chlorine ·7, total solids 4·9 grains. That quantity could hardly be due to organic acid, and was probably hydrochloric acid. He had not a sufficient quantity of water to determine that point, but he should apply himself to it on his return. If it were due to hydrochloric acid it rather pointed to the necessity for care in evaporating water, as if this is done, as usually, in a platinum dish, some of the hydrochloric acid might be lost. It would be apparently wise to distil the water and test the distillate for chlorine. This water was taken from a moorland stream.

Mr. LINFORD said, years ago, when he was at Canterbury, new waterworks were established, pumping from a deep well water which was very hard, nearly 20°. The Town Commissioners arranged to precipitate lime out of the water, and send it to the town as precipitated soft water. At that time there was considerable doubt whether this very soft water, containing $1\frac{1}{2}$ grains of carbonate of lime, was safe to send through lead pipes, and it came into his hands to test. After keeping some forty-eight hours in a leaden vessel, giving it every possible opportunity of dissolving, it was found that $1\frac{1}{2}$ grains of carbonate of lime per gallon was quite sufficient to prevent any solution of the lead by the water. That being spring water was not liable to contain acid such as the water spoken of by Mr. Reynolds. At the same time he thought it was a mistake of many of the public bodies to be searching for the possibility of supplying very soft water; they were beginning at the present time to find in Glasgow that the health, especially of the children, was not so good as when they had a water with more lime in it, although of course children taking milk took a tolerable amount of lime. In valleys where soft water was drunk there was a deficiency of lime for the health of growing children, and he believed a moderately hard water was much more wholesome to drink than quite a soft water. At the same time there was no difficulty with water which contained a fair amount of carbonate and sulphate of lime in softening the supply. He did it himself; he had a tub in which a certain amount of carbonate of soda and quicklime was placed, and it was filled up every two or three days, allowed to settle, and then used. When a deposit accumulated t was

cleaned out, and the tub filled up again. He therefore always had water quite soft enough to wash in, but at the same time he drank that which did contain sulphate of lime. In many processes of manufacture, especially brewing, a certain amount of lime salt, especially sulphate, was necessary for the preservation of the aroma of the hop. He knew breweries where very soft water was used where they were unable to brew bitter beers, and to them he recommended putting a shelf round the water cistern and filling it with lumps of gypsum. This acted perfectly, and they now brew as good beer as anyone else. The public wanted educating to the idea that the softest water was not the best for drinking purposes.

Dr. THRESH said the question that they were considering was not so much whether soft or hard water was best for drinking purposes. Mr. Reynolds had offered a suggestion which was very valuable, which public analysts and others should take note of. It was desirable in all cases where an analyst was consulted in reference to a water supply, that the greatest importance should be laid on the point whether the water was likely to have any action on lead. The authorities who sent samples of water for analysis rarely seemed to think of it, and he had seen many reports sent in by analysts in which it had never been mentioned. He did not consider any report on water intended to be used for domestic purposes to be complete unless the analyst added something with reference to the action of that water on lead. In many cases it would be of the utmost value to the sender of the water to have this action pointed out. Mr. Linford's statement about the health of children being affected by soft water was a most startling one; they all knew that after Glasgow was supplied with soft water the death rate went rapidly down, and to be told now that the children were beginning to suffer was a somewhat alarming statement. He did not know what authority Mr. Linford had for the assertion.

Mr. LINFORD said two Glasgow medical men.

Dr. THRESH said he had never seen anything of that kind reported, and was much inclined to doubt it.

Mr. DOTT said he believed it was the case that the medical officer for Glasgow thought the soft water from Loch Katrine had a bad effect on the health of the children in the city, but that was not the opinion held by the best authorities on the subject. He had no doubt it was a delusion. There were children in other districts where the water was as soft who were in perfect health. He had no doubt any ill effects were due to insufficient nourishment, and not to the softness of the water.

Mr. KINNINMONT said there certainly was in the lower districts of Glasgow a good deal of limb distortion. Much of that depended on the want of lime, but that came from want of lime in the food; there was not enough milk or porridge; they took tea and bread, and the consumption of sugar was very great, owing to its cheapness, which had the effect of eliminating the lime from the system. However, in the districts inhabited by the upper classes, where they did use porridge considerably, the children seemed remarkably healthy, though in the east end and the poorer districts there was a great amount of sickness, and many children with distorted limbs. In the better class districts, and even in the lower classes, there was a great increase in the consumption of lime water, as the people had got it into their heads that they should take lime. In Pollokshields a large quantity of lime water was sold, and in the poorer districts the people made it themselves and added it to children's food, as they thought it would gradually eliminate this distortion which existed. The health of Glasgow was much improved since the city had been supplied with Loch Katrine water. He could remember when every autumn there was an immense amount of diarrhœa, but such a thing was almost unknown now. As for the action of soft water on lead, that might be obviated.

Mr. CHAPLIN (Wakefield) said there had recently been a new supply of water from the moor districts, and the public was rather inclined to be frightened, from the idea that such water had always an action on lead. Mr. Kinninmont said the water obtained from Loch Katrine had as great an action on lead as distilled water, and they knew that the water supplied to Huddersfield had been attended with bad effects, which were attributed to that action on lead. Consequently, when the new supply was turned on to Wakefield there were very great fears that there would be deleterious effects to the inhabitants. He had opportunities of looking into the subject, and although he had not examined it very minutely, he had done so roughly, and found, much to his surprise, that the water seemed to have no action on lead at all, or at any rate to a very slight extent. Comparing it with distilled water, the difference was extremely marked. He sent some of it to his son, who was an analyst, and he found that there was a certain amount of salts in the water, and on looking into Taylor's work on poisons he found it there stated that a certain amount of salts in water would act as a protective against the action on lead, and comparing the analysis of this water with the amount of salts mentioned by Taylor, it was found that the water contained a little more than the quantity mentioned as being a protection from the action on lead, namely, about 1 in 6000. He thought they ought to disabuse the public mind as much as possible of the unreasoning fear of the effect of water obtained from moorlands upon lead. It did not follow because it had an effect in one case that it would do so in every other. The strata over which the water flowed previous to collection must be taken into consideration.

Mr. REYNOLDS said whilst the paper certainly suggested the somewhat discursive remarks, to which probably it was not necessary to attempt any reply, it was gratifying to him that such authorities as Mr. Allen and Dr. Thresh recognized the fact that something ought to be done to make the analyst more definite in his verdict with regard to the waters submitted to him. No one could doubt that there was a very extensive evil; medical men could hardly appreciate yet the extent of mischief which might be attributed to lead poisoning, for it was much more insidious than many were aware of, and unless guarded against it would be likely to increase owing to the large scale on which these waters were now being used. The only directly contentious matter in the discussion was that coming from his friend Dr. Thresh, whose suggestion rather traversed his own in thinking it would be better, instead of informing the client how the water should be taken, that the analyst should himself make the experiments as to its maximum power of acting on lead. Now he would prefer that the conditions should be identical with those in the client's house. If the water came from Mr. Allen he should like to have the very pipe and the very kettle that was used, instead of having a new pipe which would be used in the laboratory, which would be perhaps the more severe test, but not be so informative as if the client took a sample under absolutely fair conditions.

The next paper read was on—

VERMIN-KILLERS CONTAINING STRYCHNINE.

BY ALFRED H. ALLEN, F.I.C., F.C.S.

The composition of certain vermin-killers containing strychnine as the active principle recently acquired an active interest for me in connection with a murder by poisoning which occurred at Swanwick, near Alfreton in Derbyshire. Kate Horton, a child aged eight, whose life was insured, died of suspicious symptoms, and, a certificate being refused, an inquest was held, and the

viscera were subsequently submitted to me for analysis. From the stomach I isolated 0·3 grain of strychnine, from the intestines 0·2 grain, and from the liver 0·3 grain. Taking the amount of strychnine absorbed in the system as five times the weight contained in the liver, and adding to this the quantities contained in the stomach and intestines, I estimated the weight of strychnine taken at about 2 grains. In the stomach and intestines there were numerous particles of blue colouring matter, some of which I distinctly proved to consist of ultramarine, though a few others were of less definite character. Before death, the child had stated that her "father had given her something blue out of a bottle in a cup," and hence it became extremely important to ascertain whether the prisoner had purchased any vermin-killer recently. In his confession made after conviction, the murderer admitted that he had purchased vermin-killer and had used it exactly in the way alleged. The police consequently obtained packets of vermin-killer from various shops in the neighbourhood of the murder and submitted them to me for analysis. The results appear to possess sufficient general interest to bring before the members of the Conference. They are remarkable as showing that while a few of the local pharmacists sell well-known vermin-killers, such as those of Battle, Steiner and Craven, the majority prefer to make up their own powders. I confess I was surprised to find this to be the case, but the discussion will probably show how far the practice obtains in other districts. In the following table the local powders are distinguished by letters, and those sold wholesale by numbers.

Name or Mark.	Weight of Powder in Grains.	Price.	Strychnine.		Nature of Starch.	Colouring Matter.
			Weight in grains.	Percentage.		
Local Preparations.						
A	—	2*d.*	—	—	Rice	Prussian blue.
B	—	—	—	—	Rice	Ultramarine.
C	14·7	3*d.*	1·05	7·2	Rice	Ultramarine.
D	—	1*d.*	—	—	Rice	Ultramarine.
E	11·5	3*d.*	0·60	5·4	Rice and Wheat	Carmine.
F	61·4	6*d.*	2·50	4·2	Rice	Ultramarine & Prussian blue.
G	14·5	—	—	—	Rice	None.
Wholesale Preparations.						
1	5·6	3*d.*	0·61	10·9	Wheat	?
2	11·8	3*d.*	0·80	6·7	Wheat	Ultramarine,
3	13·1	3*d.*	1·12	8·7	Rice	Ultramarine.
4	11·6	3*d.*	1·28	11·1	Rice	Ultramarine.
5	13·1	3*d.*	1·70	13·0	Rice	Ultramarine.
6	21·5	6*d.*	2·42	11·2	Wheat	Prussian blue.
7	49·2	3*d.*	2·85	5·8	Wheat	Soot.
8	30·5	3*d.*	3·45	11·3	Wheat	Prussian blue.
9	16·6	3*d.*	3·81	19·4	Rice	Carmine.
10	10·0	3*d.*	4·18	41·8	Rice	Ultramarine.

The wholesale preparations included the vermin killers of Barber, Battle, Butler, Clift, Craven, Floyd, Gibson, Hunter, Steiner and Thurston. The results show, somewhat contrary to my expectation, that ultramarine is the favourite colouring matter. It will be observed that sample G was wholly uncoloured, though on the wrapper it was duly announced that the contents were poisonous and contained strychnine. No. 1 was only very slightly tinted, being of a pale flesh tint, and No. 9 was only of a pale pink colour.

Sample F is of interest, as there is good reason to believe that it was the particular powder used by the murderer Horton, although no sale to him was recorded in the poison-book. The vendor of sample F stated that he had ceased to use ultramarine for some years, and that all the vermin-killer he had recently sold was coloured with prussian blue. On examination, the whole powder was found to be coloured uniformly with ultramarine, but it also contained particles of sensible size which I identified as prussian blue. Sample F is also remarkable for its great weight and for the large amount of strychnine contained in it.

E is interesting as an example of a preparation containing two kinds of starch and coloured with carmine.

Of the preparations containing strychnine quoted in wholesale price lists, Battle's vermin-killer is probably the best known and most extensively used. The colouring matter appears to have been uniformly prussian blue, but the following table shows that the composition ascribed to Battle's powder has varied in other respects at different periods:—

Authority.	A. S. Taylor.	A. J. Bernays.	T. Stevenson.	A. H. Allen.	Tardieu.	Woodmann and Tidy.
Date	1862	1876	1882	1889	—	—
Price of packet	3*d.*	3*d.*	6*d.*	6*d.*	—	—
Weight of powder . . .	13 grs.	15 grs.	25 grs.	21·5 grs.	20 grs.	—
Colouring matter . . .	Prussn. blue	Prussn. blue	Prussn. blue	Prussn. blue	Prussn. blue	Prussn. blue
Starchy matter	Flour	Wheat flour	—	Wheat flour	Potato-starch	Flour
Strychnine; grains . . .	0·75	1·6	2·5	2·4	1·5	—
Strychnine; per cent. . .	5·8	10·7	10·0	11·2	7·7	23·0

Woodman and Tidy state that sugar is a constituent of Battle's vermin-killer. It is certainly not so at the present time. The proportion of strychnine (23 per cent.) given by Woodman and Tidy is largely in excess of that found by other chemists, and is probably incorrect.

No. 7 deserves notice as a preparation having a distinct individuality. The colouring matter is some kind of carbon, apparently soot, but the quantity used is only sufficient to make the powder grey. The preparation is apparently variable in composition, for in 1876 Dr. Bernays found one packet to consist of a mixture of flour, soot, and strychnine, whilst in another packet the strychnine was replaced by barium carbonate. At the present time, the powder contains both strychnine and barium carbonate, an analysis made in my laboratory showing :—

	Per cent.
Strychnine	5·8
Barium carbonate (native)	45·0
Flour and soot (by difference)	49·2
	100·0

The association of strychnine and barium carbonate in the same preparation is remarkable, and it would be of interest to learn the real or supposed advantage of the combination.

With regard to the identification of the colouring matters, ultramarine is readily recognized by the peculiar shade of blue it communicates to the powder, and which is wholly destroyed on agitating with dilute acid. If a little of the powder be placed on a silver coin and moistened with dilute acid, a brown stain will be produced on the coin by the sulphuretted hydrogen liberated from the ultramarine. Ultramarine retains its blue colour after ignition, whereas prussian blue leaves a brownish residue of oxide of iron, and indigo is more or less perfectly consumed, according to its purity. A distinct ferruginous ash is left by some specimens of indigo. Prussian blue and indigo are of course unaffected by treatment with dilute hydrochloric acid. If the washed residue left after heating the powder with dilute hydrochloric acid be treated with a caustic alkali, it will be unaffected if composed of indigo ; but prussian blue will be turned brown and the filtered liquid will contain a ferrocyanide, and hence will yield a blue or green coloration or precipitate when it is acidulated with hydrochloric acid and ferric choride added.

The great variation in the amount and proportion of strychnine contained in the different preparations deserves attention. I have used two methods for the determination of strychnine. One has been to exhaust the dry powder with chloroform, then evaporate the solution to dryness and weigh the residue of strychnine. Benzene may be substituted for the chloroform. This process gives satisfactory results with free strychnine, but if the powder were to contain a salt of strychnine the extraction would be very incomplete. Error from such cause, however, may be readily avoided by testing the residual powder for strychnine by the taste and the oxidation-test. An alternative, and in many respects preferable, method is to treat the vermin-killer with water acidulated with acetic acid, until the residual powder has no bitter taste and gives no coloration by the oxidation-test. The solution is then treated with excess of ammonia and shaken with a mixture of chloroform and ether. The ether-chloroform layer is separated from the aqueous liquid, evaporated to dryness, and the residual strychnine weighed.

It does not seem to follow that the vermin-killer which contains the greatest weight or the largest proportion of strychnine is necessarily the best. Clearly, pure strychnine would be inefficient, and hence the object should be to compound a mixture which will have the most powerful poisonous effect compatible with its attractive and appetizing character. To effect this, the bitter taste of the strychnine should be masked as far as possible, and a suitable odorant should be added. This object seems to have been recognized in one instance, for the powder contained sugar and had a powerful smell of asafœtida and oil of anise. In most instances, the vermin-killers examined were odourless.

But besides rendering a vermin-killer attractive to the animals it is designed to kill, it is highly important that it should be so coloured as to preclude the chance of its being taken accidentally by a human being, and so as to facilitate its detection in cases where it has been used for the purpose of suicide or murder. It is not too much to say that had the blue colouring matter been absent from the vermin-killer which Horton gave his child the murderer would have escaped conviction, from the impossibility of connecting him with the administration of the poison.

From an inspection of the samples of vermin-killer of which I have given the analyses, it will be seen that many of them do not satisfy the condition which I maintain is necessary, namely, a colour sufficiently strong and characteristic to attract the attention of the taker. As already stated, sample G is purely white, and the flesh tint of No. 6 and pale pink of No. 10 afford no sufficient protection against accident or malpractice. The soot contained in No. 3 is not present in a sufficient proportion to serve its intended purpose, and the identification of minute particles of carbon would be difficult or impossible if in admixture with food. Teething powders are so generally coloured pink that they are not unfrequently asked for as "pink powders," and grey powders are equally common. The blue colouring matters present considerable advantages over such pigments as carbon and carmine. There is no food, drink, or medicine which has naturally a blue colour, and hence the tint at once attracts attention. Of the blue colours practically available each has its advantages and countervailing objections. Ultramarine is too readily destroyed by dilute acids, and by the gastric juice, to be quite suitable, though it has the advantage of being readily detected and of being undestroyed by ignition. Prussian blue is unaffected by acids, and is not very readily affected by dilute alkaline liquids. Indigo resists alkalies still better, and is not affected by acids, except nitric acid, though it is at once bleached by oxidizing agents, and is also decolorized by alkaline reducing agents. In minute quantity it is less easily recognized than prussian blue. A mixture of the three pigments would undoubtedly be preferable to any one or two of them.

On the whole, perhaps the most suitable pigment for colouring vermin-killers would be chrome-green (oxide of chromium). In it we have a bright green pigment of high colouring power, quite insoluble in water and in dilute acid and alkaline liquids. It is wholly permanent under all imaginable conditions, and is not affected by ignition. Chromium is not a natural constituent of the body, is not used internally as a medicine, and is not liable to be present accidentally, even in traces, in any beverage or article of food. It can be detected and determined with ease and certainty even when present in very minute quantity. Owing to its insolubility, oxide of chromium would remain wholly unabsorbed if taken internally. Hence if it were added to preparations of strychnine, etc., in a definite and invariable proportion, an estimate of the minimum amount of the poison taken by a deceased person could be arrived at by determining the quantity of chromium contained in the alimentary canal, even though the poison itself had been wholly absorbed or decomposed ; and this could be effected with equal ease and certainty after prolonged inhumation, or even after cremation of the body.

The discussion of the best pigment for colouring vermin-killers has not merely an academic interest,

for the present facilities of obtaining and misusing poisons have recently attracted much attention, and it is not improbable that next session further legislation may be attempted with reference to the sale of poisons. Every pharmacist is aware that special restrictions exist with regard to arsenic, which cannot legally be sold in quantities of less than 10 lbs. unless coloured with soot or indigo. This provision is good in theory, but badly devised. It prevents the sale of an ounce of unmixed white arsenic to a professional chemist like myself, for strictly proper purposes, but it does not prevent a would-be murderer from obtaining a large quantity of the poison, provided he can give some plausible excuse for requiring it. It is interesting to note that all the solid arsenic found in the house of the late Mr. Maybrick was mixed with charcoal (not with soot or indigo), while two bottles were also found containing some of the coloured arsenic mixed with water. The discovery of a stained handkerchief in association with this coloured arsenic suggests that an attempt was made to filter the solution from the charcoal, which proving unsuccessful, the experimenter had recourse to an infusion of arsenical fly-papers. As already pointed out, charcoal and soot are by no means suitable pigments for colouring poison, and indigo is not the best for the purpose. Pharmacists can do much to prevent accidental and intentional misuse of vermin-killers and such preparations if they will habitually add sufficient of a mineral pigment to colour the powder a decided blue or green, and will take more care to record sales of vermin-killer in the poison-book than is at present the practice in some districts. But it would be useless to enact that all preparations of arsenic, strychnine, and other deadly poisons sold as vermin-killers should be coloured with a certain proportion of mineral pigment if the sale of fly-papers containing a dangerous or fatal dose of arsenic or other poison is to be permitted with impunity. Clearly all such fly-papers should be impregnated with some soluble colouring matter which would colour the water in which they were soaked. Sulphonated indigo ("indigo-carmine") would be a suitable colouring matter for the purpose, though the coal-tar dye known as safranine would present some advantages.

But organic colouring matters can be removed from solution by simply immersing silk, wool, or mordanted cotton in the liquid, and hence are less suitable for the purpose in question than certain inorganic colouring matters. Of these the soluble salts of chromium present several advantages. Thus, if in the form of the double tartrate of chromium and potassium (or a mixture of chrome-alum and Rochelle salts) the chromium is not precipitable from its solution by alkalies, acids, sulphuretted hydrogen, sulphide of ammonium, or phosphates or carbonates of the alkali-metals, and cannot be withdrawn from solution by either animal or vegetable fibres. On the other hand, the chromium will not interfere with the detection and determination of arsenic, strychnine, and other poisons, and can be itself determined with ease and accuracy after evaporating the liquid to dryness and igniting the residue.

I have to acknowledge the assistance I have received from Mr. Chas. Harrison, Mr. Wm. Chattaway and Mr. T. H. Pearmain in making the analyses already referred to.

The PRESIDENT desired to thank Mr. Allen for his practical and very far seeing paper, in which he actually went so far as to foresee what might come of cremation. He was sure gentlemen would think it over when they got home, and would act upon it, for the suggestions made seemed most valuable, not only to pharmacists, but to the public, the medical practitioner, the toxicologist, and all concerned either with medicine or the health of the public.

Mr. NICOLL asked if the mineral coloring matters suggested were not used in the manufacture of confectionery?

The PRESIDENT said he thought these colours were now quite discarded and replaced by vegetable colouring matters.

Mr. FOGGAN said he was about to put a similar question, for a few days before he had seen a blanc-mange coloured and ornamented with a beautiful green. He thought if Mr. Allen's suggestion were adopted they might be laying a trap for themselves, and find strychnine mixed with their blanc-mange.

Mr. DAVID MACLAREN (Edinburgh) asked if confections were not coloured with that particular shade of colour which Mr. Allen suggested. If so, his theory that no article of food at present in existence bore that colour was not correct.

Mr. WARD (Leeds) thought some of the suggestions in this paper were well worthy of consideration. In listening to the paper it occurred to him that the colour of the vermin powder was not so important a matter as the percentage of strychnine it contained; but as Mr. Allen continued he saw that there was a very valuable suggestion in the idea of colouring with chromium compound. At the same time he did not see that any good would come of that unless it were enacted by Parliament that all vermin powders should have a definite composition, and that the percentage of chromium oxide, as well as the percentage of strychnine, should be specified. If that could be done then he could understand that the addition of a substance like oxide of chromium, which was difficult of solution and not assimilable, would be a matter of very great moment. He did not know whether the Conference had the means of representing the matter to any Parliamentary committee, but the Pharmaceutical Society might take up the question, and see if anything could be done. It would very greatly strengthen the hands of the analyst if he had this coincidence of the presence of chromium to assist him in detecting very small traces of strychnine. Mr. Allen had said that he did not know why carbonate of barium should be used, and he did not either, unless it was that it was often used as a poison for rats, and perhaps some people who were making these vermin-killers had an idea that it would answer as a poison for beetles also.

Mr. PROCTOR said there was always a negative side as well as a positive to a matter of this kind. One of the great advantages which Mr. Allen had pointed out as attending the use of oxide of chromium was that it was very difficult of solution; but on the other hand that might be a disadvantage, because a person who got a vermin killer might dissolve out all the poison and leave the chromium behind, and he would then have the poison free from all colouring matter, and therefore free from all evidence of its presence.

Mr. PLOWMAN said it struck him as most remarkable that any pharmacist should sell a vermin-killer containing $2\frac{1}{2}$ grains of strychnine without the sale being registered; that was a most astonishing thing. He was interested in colouring matter contained in vermin-killers from a case he recently had to investigate of a suicide in South Lambeth, in which the residue left in the glass had been brought to him for analysis. The person who had taken the stuff was not actually dead and he found strychnine almost immediately. He then examined the blue colouring matter and found it mainly prussian blue, but there was some further blue colouring matter which he could not identify at the time, and he did not care to take it up again, but very possibly it was an admixture of ultramarine. He should like to ask Mr. Allen whether in examining these vermin-killers he ever found a sample consisting of arsenic. He was under the impression that some vermin-killers sold in old times used to consist of arsenic, but strychnine could be used now, and

it was very cheap compared to what it used to be. He must take exception to one statement in the paper, if he understood Mr. Allen rightly, that the results of a poison depended on what was absorbed in the system, not what was found in the stomach, because there were many exceptions to that general statement.

Mr. SCHACHT remarked that one gentleman made the suggestion that it was possible in some future legislation on the subject of poisons that the Pharmaceutical Society, as representing pharmacists generally, might be able to assist. He should like to say, as almost the only member of the Council on that side of the table, that there was a generally understood impression in Governmental circles that though Pharmaceutical education might be relegated to the Pharmaceutical Society, all matters connected with poisons and the care of the public health should be absorbed by some Government department. He took this opportunity of saying that he hoped the publication of that day's proceedings might perchance serve in some measure to correct that impression, and convey even to the official mind the idea that possibly pharmacists knew something of that which concerned the public health.

Mr. BRANSON said the objection raised by Mr. Proctor could very well be met by the admixture both of a soluble salt of chromium and an insoluble salt.

Mr. ALLEN, in reply, said with regard to the question of the coloring of confectionery the oxide of chromium was simply an insoluble powder, and if introduced in any quantity into a jelly would very soon spoil its appearance. Such green colouring matters as were used in confectionery were usually derived from plants, chlorophyll, or something of that sort. If he found officially any chromium were employed for such a purpose he should think it his duty to report accordingly, but he was inclined to think that such practices were entirely obsolete. One gentleman had spoken of green blanc-mange; he did not know whether that gentleman was an Irishman, but it struck him as being rather an extraordinary expression, and perhaps it was a slip. What had been said about constant composition was distinctly foreshadowed in his paper, and he would say distinctly he thought they might hope for legislative action in the matter of poisons, so that it would not be possible to sell colorless vermin killers. It was monstrous that a fatal dose of colourless strychnine could be obtained for 3*d*. or even for 1*d*., and it was directly contrary to the principle of the Arsenic Act, which was that all poison when sold to the public ought to be coloured, and he hoped that would be extended to vermin killers containing strychnine or any other active poison. It was very possible that the Act would not necessarily specify the exact colouring matter to be used or the exact amount, although it ought to do so, otherwise they would be coloured by a small quantity of ultramarine or carmine, which was not sufficient. It was very desirable to choose a colouring matter which could not be readily removed, which no doubt was intended by the framer of the Act, who gave the choice of indigo or soot. But on the other hand he contended that the oxide of chromium was preferable to any other colouring matter; it was cheap, wholly insoluble, and could be detected with great facility; it was absolutely unacted on by any chemical reagent, except the most powerful oxidizing reagents like strong nitric acid, and even then only with great difficulty. Fresenius classed the oxide of chromium amongst the few substances insoluble in all acids, and which had to be fused with sodium carbonate and nitrate to bring them into solution. The facility with which it could be detected in small quantities placed it above all others for the purpose. He had concluded his paper by suggesting that perhaps sulphonated indigo, or indigo-carmine, as it was sometimes called, would be a suitable colouring matter for colouring fly papers. A soluble organic salt of chromium would be better even than the soluble indigo. Probably a mixture of one of these colouring matters and chrome green would be the best for solid vermin killers and would get over Mr. Proctor's difficulty. There would be a blue or green solution and a green residue, and the colour of the solution could not be destroyed by an acid or by an alkali, and the general run of poisoners would find a great difficulty in dealing with it. Of course the more intelligent class of murderers would not have occasion to use coloured vermin killers at all. He was aware that carbonate of barium was a very successful poison in some cases, for poisoning fowls amongst other animals, but it struck him as a curious combination to mix it with strychnine. It looked as if strychnine was not thought good enough by itself, and carbonate of barium not good enough, and therefore the two poisons were united in the same powder. Of course Mr. Plowman was quite right in saying that his statement that what poisoned a person was what passed into the system and not that which remained in the stomach was open to considerable limitation. He was thinking at the moment of strychnine especially. When they took white arsenic, which he hoped they would not, or gave white arsenic to a person, which he was sure they would not do, the white arsenic being in the solid state the coats of the stomach would necessarily be seriously irritated by contact with the poison; again, strong mineral acids would act in the same manner. In other words he intended to limit his remarks to strychnine, which might be absorbed, and pass out of the system, but the chromium green would remain.

(*To be continued.*)

Review.

PROCEEDINGS OF THE CHEMISTS' ASSISTANTS' ASSOCIATION. No. V. 1889.

The appearance of this new volume, containing a report of the papers read and the discussions at the meetings of the Chemists' Assistants' Association during the session 1888–89, occurs most opportunely just as the work of another session is commencing. With one or two exceptions the papers and discussions are printed as they appeared in this Journal, so that our readers will already have had an opportunity of making themselves acquainted with the good work being done by this vigorous Association. It will, however, be admitted that the quality of the papers, as a rule, justifies their reproduction, whilst the convenience of having them gathered into a compact volume for the special benefit of the members must be evident. In respect of the printing and general appearance the present volume is perhaps hardly up to the standard of its predecessors. But this probably is due to financial considerations, and the wonder is that the members can, in return for so small an annual subscription, be supplied with so creditable a volume of "Proceedings," in addition to the other advantages accruing from connection with the Association.

ANSWERS TO CORRESPONDENTS.

L. Thomas.—Information respecting the curing of vanilla will be found in the *Pharmaceutical Journal* for April 20, p. 845, and August 31, p. 170.

Assistants for India.—A correspondent who has noticed the appearance of advertisements offering engagements in India at a salary of one hundred rupees a month, with board and lodging, expresses strongly the opinion that at the present value of the rupee such a sum is totally inadequate to meet the contingencies of the climate, as in order to make life tolerable in India expenses have to be incurred that would not be dreamt of at home.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Proctor, Macartney, Wright, Ellwood, Ferrall.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 142.)

Argentine Republic.—The exhibit in this Court is large and well displayed. In the Agricultural Department there is a fine show of La Plata linseed, anise, cummin and several other crude products known in pharmacy. The collection of native remedies forms, however, a special collection, and comprises several hundred specimens representing the different provinces of Les Missiones, Tucuman, Yuging, Cordoba, Catamarca, San Luis and Pampas Central. No printed catalogue of these products was procurable in August, but an excellent manuscript list was placed at the disposal of the reporter by the officer in charge of the exhibit. This list is, however, so extensive, and so little has ever been published concerning the medicinal products of this country, that it will be given subsequently *in extenso* in the form of an appendix to the present brief notes.

Bolivia.—In this Court there are several objects of interest, but the information obtainable is very meagre. The cinchona barks exhibited by Messrs. J. and G. Ugarte and M. Leon Velasco form a fine show, especially the calisaya bark, the tree being now cultivated to an enormous extent (*Pharm. Journ.*, [3], xv., p. 383, xviii., p. 360). Iodine, dark-coloured balsam of copaiba, oil of maize varying in colour from a pale straw tint to brown, and linseed oil of a pale colour, matico leaves, mate, quillaia bark, hard dry balsam of tolu, guarana and coto bark, cassia fistula pods and china root are amongst the drugs familiar to Europeans exhibited in this Court. A crystalline substance obtained from boldo leaves, probably boldoglucine, is also exhibited, and two species of fine large coca leaves. Besides these a small number of native remedies are noticeable, but at the time of the reporter's visit the catalogue was not yet printed, and information concerning their botanical source was not obtainable. Some broad short pods of vanilla, having a peculiar odour, appear to be fit only for perfumery, not for confectionery. The specimen of coca labelled "Coca de Ootacoyes," differs somewhat from ordinary coca in the more markedly triangular or cuneate base of the leaf. Some candles of myrica wax are shown by M. Leon Velasco. These in burning are said to give off a fragrant odour. One very curious product in this Court consists of a potato, said to be not fit to eat until it has been frozen. It presents a dry, white and mealy appearance, and is about the size of a small kidney potato, and is quite hard. Before use these potatoes are soaked for twelve hours in water, and then washed to remove the poisonous principle. In the hard state they keep a long time.

One of the most important products of this country is the mate, or Paraguay tea, that grown in Missiones having the reputation of being the best that exists. It is recommended as having the advantage over tea of not producing sleeplessness, and of preventing constipation. The consumption of mate in the Argentine Republic alone is estimated at sixteen millions of kilos annually, whilst that of coffee does not exceed two and a half millions. The beverage is recommended to be made by putting a teaspoonful of powdered mate into a third of a litre of cold water, and boiling it for two or three minutes. Sugar and milk are then added, or rum. The mate, with half the quantity of fresh mate, is used a second time. If preferred, it can be flavoured by the addition of cinnamon, orange, or lemon peel.

Brazil.—The Brazilian exhibits are rather crowded in the building devoted to them, and the pharmaceutical products are scattered amongst other objects from the different provinces, so that many of them are easily overlooked. Catalogues of the products of Minas Geraes and Pernambuco were procurable, but the botanical names are so carelessly given and the typography is so bad, that it is impossible to identify many of the products.

From the province of Ceara a good collection of drugs is shown by Messrs. Boris frères. Through the kindness of Mr. F. Mason, of Paris, we have been able to obtain from this firm an account of the principal articles in this collection and their medicinal uses, Messrs. Boris having indeed taken the trouble to have a transcript in French made of the Portuguese catalogue. Some of these drugs are already well known in this country, as, for instance, the following:—

Jequirity seed, *Abrus precatorius*. Used for inflammation of the eyes.

Carnauba root, *Corypha cerifera*. Used in syphilis, diseases of the skin, and in fevers.

Jatropha Curcas, or pinhao, the milk of which is considered to be the best of vulneraries. The seed is emetic; it is given in diseases of the eye, apoplexy, and intermittent fevers. The dose of the oil is 36 to 70 drops.

Mulungu bark, *Erythrina Corallodendron*. Used as a nervous sedative, and in obstruction of the liver, and in baths as an emollient.

Pereiro bark, *Geissospermum læve*? Used as an emetic and tonic in acute and chronic rheumatism.

Mangerioba, *Cassia occidentalis*, the seeds of which, used as coffee, are said to cure flatulence.

Others that appear to be generally used in Brazil, but are not as yet used in this country include—

Capeba, *Piper macrophyllum*. The root is considered useful in obstruction of the liver.

Mucambe, *Cleome heptophylla* (Capparidaceæ). A bath made from the leaves is employed for hæmorrhoids, and a decoction of the root sweetened is given internally in cases of gonorrhœa and leucorrhœa.

Gito, *Guarea purgans*. The root and bark are drastic purgatives; they are also employed in the form of a bath for swollen joints, and the decoction injected in small quantities is used to cure ascarides. It is also employed to procure abortion and in syphilis.

Andiroba, *Carapa guianensis* (Meliaceæ). The decoction of the root and bark is employed in intermittent fever as a vermifuge, and the oil of the seed externally for swellings and erysipelas.

Angico, *Acacia Angico*. The bark is used for leucorrhœa, inflammation and ulcers of the leg, and the "resin" or gum for phthisis.

Milhomens, *Aristolochia Milhomens*. The root is considered an excellent stimulant carminative in colic, and like jarinha (*Aristolochia cymbiferæ*) is used as an emmenagogue. A decoction of the leaves made with barley is used in erysipelas and colic.

Juca, *Lucuma gigantea* (Sapotaceæ). The root of the tree is purgative and is employed in dropsy, phthisis and asthma. The bark is used in the form of tincture for bruises, and is considered superior to arnica

Alcemega, *Hedwigea balsamifera* (Amyridaceæ). The resin is used externally to heal wounds, and internally, in the form of pills, as a diuretic.

Goiabeira, *Psidium pomiferum* (Myrtaceæ). The astringent bark of this tree is considered, when used in the form of decoction, to be the best remedy for gonorrhœa and leucorrhœa.

Beaume, *Myrospermum peruiferum.* The decoction of the bark is used for coughs, and the aromatic oil obtained from it, in various pharmaceutical preparations.

Jarinha or Onca, *Aristolochia cymbifera.* The root and leaves are employed as an infallible emmenagogue.

Velame, *Croton campestris* (Euphorbiaceæ). Considered to possess remarkable healing properties for the most troublesome wounds and syphilitic sores. Employed as an antiseptic in malignant fevers, and the powdered root is said to be good for gangrene.

Jurubeba, *Solanum paniculatum.* The decoction of the root is used in gonorrhœa and syphilis, and the fruit in abscesses and in obstruction of the liver.

Cabeça de negro. Bitter fecula, obtained from the root, which is used in doses of a teaspoonful eaten in the morning as a drastic purgative; yet it is used in diarrhœa, and it is stated that during an epidemic of cholera in Ceara none of those who took it died.

The medicinal uses of some of the drugs are curiously different from those of European countries. Thus *Pareira brava* is given as a stomachic in dropsy, and the juice of the leaves is employed as an antidote to the bite of serpents, a tea of the root being taken at the same time. The leaves of *Solanum nigrum* are applied as a poultice over the bladder to cause diuresis, and the seeds are given as a vermifuge. *Simaruba* is used for dysentery in Minas Geraes.

Pernambuco also exhibits an interesting collection of drugs, amongst which may be noticed the true jaborandi, jequirity, stigmata maidis, chrysarobin and white ipecacuanha, the majority of the specimens consisting of native remedies, some of which have been mentioned already. The best collections are those of J. Braza de C. Silva, of Pernambuco, and A. M. Veras. A special catalogue of Pernambuco exhibits is obtainable, but contains no information except the botanical names in some cases, and in a few instances the medicinal properties are briefly mentioned. It is curious to note that the plant which in this province bears the name of ipecacuanha is *Viola* (*Solea*) *campestris*, and that angico is referred not to *Acacia Angico*, but to *Pithecolobium gummiferum*, while Martius gives it as *P. Avaremotemo.* Also sicupira is referred to *Robinia coccinea*, and not to *Bowdichia major.* Messrs. Rouquayrol Frères, as well as A. M. Veras and Bartholomew and Co., are said to have sent descriptive catalogues of the drugs and pharmaceutical preparations, to be included in the general catalogue, but they do not seem to have been utilized in that manner.

Chili.—In this collection are shown bitter almonds in shell, walnuts, hempseed, linseed, colza, capsicum, and an abundance of haricots and vermicelli. There is no special collection illustrating pharmaceutical products.

Cochin China.—The products exhibited in this Court included star-anise (*Illicium verum*), citronelle, verbena and cassia oils, the thick bark of the cassia tree, so much prized by the Chinese, crude camphor, Ngai or Blumea camphor in the crude state and of a greenish tint, and several fixed oils, such as those of arachis and sesamum. Almost hidden away in one corner of the Court is a collection of small bottles containing the materia medica of the country. In this collection may be noticed nux vomica seeds, which form a regular article of export, coriander and castor oil seeds, both of small size, the former quite different from the large oval fruits grown in the Dutch East Indies, dill seed, brown mustard (*Brassica juncea*), papaw seed, and the seeds of *Jatropha Curcas.* A list of the less important drugs is published, but in many cases the native name only is given, the article not having been identified. It may, however, prove interesting to some of our readers if a few notes from this catalogue are quoted here, leaving the remainder to be dealt with in the form of a subsequent appendix. Logwood is employed as a vulnerary; benzoin for flatulence; mustard seed (*Brassica sinensis*), as a laxative; *Aconitum sinense* for hæmorrhage; *Verbena officinalis* in rheumatism, and turmeric to render the blood more fluid. Jujube fruits are given in asthma; *Lilium candidum* (the common white lily of English gardens) is given for cough; dill as a vermifuge and for colic and pain in the kidneys, and *Gentiana cruciata* is employed as an anthelmintic. For paralysis nux vomica is administered and also an oil obtained from nutmeg and mace; sandal wood is given for colic; the root of *Chelidonium majus* for diarrhœa, and the herb of *Teucrium Scordium* as an emmenagogue; myrrh and camphor are applied to cure itch, and oil of peppermint is used for the relief of headache, cough and asthma, and is considered to be an excellent emmenagogue. Acorus rhizome (*A. gramineus* probably) is put to a singular use, being suspended over the door of the house on the fifth day of the fifth month to keep off evil spirits! Conium root and that of *Angelica sylvestris* are employed for neuralgia. The quince is given in nervous and rachitic diseases; the common adder's tongue (*Ophioglossum vulgatum*) is given in angina and paralysis, and is also used as a vulnerary; dandelion root is applied in the form of a plaster to abscesses to cause them to burst; *Galium Aparine* is considered to be of value in diseases of the lymphatic system, and *Datura Stramonium* is said to be given as a vermifuge. It must not be inferred, however, that the natives use all their remedies in a manner different from other nations. A large number, such as valerian, umbelliferous fruits, croton oil, nux vomica, etc., are employed in a thoroughly orthodox manner. To the above may be added two or three other instances of the mixture of shrewdness and superstition indicated in the uses of drugs in Cochin China. It is believed that if a pregnant woman eats *Iris fœtidissima* she will bear a boy, and the Annamite mothers rub their infants with powdered saffron to strengthen the skin, whilst the corm is given for hæmorrhage, itch and diseases of the eye. Another exhibit in this Court consists of a series of specimens illustrating the lacquer manufacture, and amongst the articles used are gardenia fruits, yielding a yellow dye, seeds of sapindus, and those of *Aleurites cordata*, yielding the wood oil or tung oil described in a previous volume of this Journal ([3], xv., p. 636).

(*To be continued.*)

The Pharmaceutical Journal.

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THE SALE OF POISON BY UNQUALIFIED PERSONS.

THE number of addresses delivered within the last two weeks, at various places throughout the country, and the large audiences to which they were addressed, appear to show that there is in the provinces a growing feeling of the importance of association among pharmacists, not only for the purpose of promoting the education of apprentices, but also for protecting the interests of those engaged in business as principals. At Dundee, Sheffield, Birmingham, Glasgow and Leicester, the annual meetings of the local associations have furnished opportunities for admonishing pharmaceutical students of their educational needs, and of offering a general review of pharmaceutical affairs. In most instances, we have been enabled to publish these addresses *in extenso*, and it will not therefore be necessary to do more than refer our readers to them as containing matter that is well worth their consideration. In some instances the annual gatherings of pharmacists have been taken advantage of for the purpose of discussing political matters of special interest. This was notably the case at Sheffield, where at the dinner which took place after the meeting, Mr. PRESTON, in proposing the toast of the Pharmaceutical Society, spoke of the recent case of poisoning by vermin killers and of the probability that the action of the coroner who conducted the inquiry into the circumstances would lead to prosecution of the actual seller of the poison, on the ground that he was unqualified in accordance with the requirements of the Pharmacy Act, 1868. Mr. PRESTON regarded this as a matter of serious importance to the pharmaceutical body, and one that should be very carefully considered in all its bearings. If it be, as the coroner considers, an offence against the law for an unqualified assistant to sell poisons, it cannot be doubted that in many instances chemists will require to adopt greater precautions in the sale of poisons than has always been the case hitherto. It has been considered that the qualification of the proprietor of a chemist's establishment sufficed to legalize the sale of poison by any person in his employment, subject to the observance of certain regulations as to the labelling of such articles, and in particular cases the registration of the sale. This, however, is not the view of the law taken by Mr. BRAXTON HICKS. He holds that it is not only necessary for every person who keeps an open shop for retailing, dispensing, or compounding poisons, to be registered as qualified, but also that any person who actually sells a poison shall be so qualified. This view as to the liability under the Pharmacy Act of the actual seller of poison is not by any means new. It has been frequently expressed by the judges before whom cases of prosecution have been heard, and also in the discussion that took place in the House of Lords in reference to the Pharmacy Act Amendment Bill. Indeed the qualification of the actual seller of poison has been in some instances regarded as the particular safeguard which is necessary in the interest of the public.

But if that view of the provisions of the Pharmacy Act in regard to the sale of poison be upheld, the immediate result will be that many chemists in the country will be placed in some difficulty. Some of them do not employ qualified assistants, and in such cases sales of poisons would have to be conducted by the principals, or in the event of their absence from business, they would have to be declined. This would no doubt entail much inconvenience, as Mr. PRESTON pointed out, especially in country places, where a small business did not allow of a qualified assistant being kept. However, if the view we have referred to be the correct interpretation of the Pharmacy Act, it will be incumbent upon chemists to adapt themselves to this state of things and to regulate the conduct of their business in accordance with these requirements. It might even be a matter of trade interest for a chemist to establish the rule that no poison should be sold in his shop except by a duly qualified person, and on that basis to commend his establishment to the public as one where the greatest precaution against accident could be relied upon. There is also another view of the matter, to which Mr. PRESTON referred as being one offering a prospect of benefit to chemists. It is not unfrequent to hear young men complain that there is not sufficient inducement to qualify themselves for registration, because the prospects of business are so poor, and the demand for qualified assistants is not great. But if the sale and dispensing of poisons can only be carried out by qualified persons, a general recognition of this necessity would increase the demand for qualified assistants, and many who now are content to remain unqualified would be induced to pass the requisite examination. The opening for assistants would be improved and the over competition that now prevails might be reduced. This expression of opinion created considerable interest, but as the occasion was not one favourable to discussion it was thought desirable that a special meeting should be held in Sheffield for that purpose.

So far we have dealt with this question entirely from the point of view in which chemists

would be directly affected, but it so happened that the subject was afterwards spoken of by one of the outside public, and in a manner so especially worthy of attention, that we think it desirable to reproduce the speaker's remarks in full. In returning thanks for the toast of the visitors, Mr. ROBERTSHAW, the Chairman of the Sheffield Board of Guardians, said:

"I have been much edified and instructed by the very eloquent speeches which have been delivered, and one subject has been introduced about which I should like to offer a few brief remarks; I mean the sale of poisons by other than duly qualified persons, and the duty of the Pharmaceutical Society in regard to prosecuting in a case referred to. You have had granted by the legislature, through Her Majesty's Privy Council, a certain Charter. In making application for that Charter, doubtless one of the strongest points urged would be the protection, safety, and welfare of the people, by allowing none but those having the requisite specific knowledge to carry out your particular profession. Having by your Charter gained especial privileges, they bring with them specific responsibilities and duties, which I conceive you should carry out in all good faith, even though it may somewhat add to the necessary expenditure of your individual establishments. Many here to-night are not only visitors at your festive board, but we, as well as the various members of our families, are often visitors at your shops. In your hands our healths—nay, at times our very lives—are placed, and therefore it is of the utmost importance to us that you should fairly carry out the responsibilities which are incumbent upon you, and, if asked, aid the authorities in securing the conviction of those who disregard and infringe the law."

These remarks, offered on the spur of the moment, call for no comment; but we may ask our readers to consider what would be the estimate formed by Mr. ROBERTSHAW or other members of the outside public holding similar views as to the confidence to be placed in any chemist who held a contrary opinion? In this connection alone it seems to have been a wise provision for ensuring free discussion that the important question now at issue was not dealt with in open council.

Our American contemporary, the *National Druggist*, in reproducing certain laudatory statements in reference to a new chemical product recommended for use in medicine, remarks that if those statements may be credited the article in question is destined at once to take a front rank among medicinal agents. In explanation of this qualified prediction it is added that there is good reason for believing that the German scientific press has within the past two years shown itself to be quite as ready as that of England or America to lend itself to the seductions of the manufacturing chemist. It is certainly too much the practice in such cases to seek from editors of journals recommendatory notices and comments which would at best find a more appropriate place in ordinary advertisements, and it cannot be denied that the appearance of such notices in influential journals affords room for regret, if not for suspicion, such as that suggested by our American contemporary.

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A meeting of the Chemists' Assistants' Association will be held on Thursday, October 24th, when a paper will be read on "Bacteria," by Mr. F. Davis, B.Sc.

Pharmaceutical Society of Ireland.

ANNUAL MEETING.

The annual meeting of the members of the Pharmaceutical Society of Ireland was held on Monday evening, the 7th inst., in the rooms of the Society, 11, Harcourt Street, Dublin, at half-past seven o'clock.

The following members of the Council were present:—The President, Mr. Hogdson (Treasurer), Wells, McCormack, Professor Tichborne, Beggs, D'Arcy and Simpson. The members of the Society who attended were Messrs. J. T. Holmes, James N. Hardy, Michael F. O'Donnell, Albert Bell, P. J. Lyons, J. McCreery Hill, R. J. Downes, B. J. Costello, R. Duggan and A. Raynor.

The chair was taken by the President of the Society, Mr. Charles Evans.

The Registrar, Mr. Ferrall, read the minutes of the last annual meeting, which were signed.

The President said the first business was the appointment of scrutineers of a ballot for the election of members of the Council to fill the vacancies caused by outgoing members, who were the following: Messrs. William Hayes, William Nassau Allen, Charles R. C. Tichborne, LL.D., Alexander Elliott Doran, John Chilcott C. Payne, George Howell Grindley, and Charles Evans.

On the motion of Mr. Wells, seconded by Mr. Downes, Messrs. McCormack, Hardy and Hill were appointed scrutineers, and inspected the ballot papers. Their report having been made, the President announced that the following gentlemen had been elected: Dr. Tichborne, 60 votes; Mr. Charles Evans, 59; Mr. Grindley, 58; Mr. Doran, 55; Mr. Andrew McNaught, 53; Mr. Johnston Montgomery, 53; and Mr. William Hayes, 34.

The President then said: Gentlemen, allow me to make a few brief observations on the condition of the Society during the past year. We may congratulate ourselves on having made some progress in some respects. You all know the difficulties through which the Society passed during the last year, especially in connection with the failure to arrive at a unanimous conclusion respecting the Bill which was to be laid before Parliament. We must all regret the withdrawal of so many members from the Society, for no matter how we may have differed in judgment from those gentlemen, they worked zealously and well for what they considered to be the good of the Society. As to the examinations, the results have been very similar to those of the previous year. At the Preliminary there were 56 candidates, being one less than in the preceding year, and of these 34 were successful. For the license there were 38 candidates, being a decrease of 4 from from the previous year; and 21 of these passed. But you must remember that latterly the Society has been accepting the Preliminary examinations of several other licensing bodies, and therefore the number of candidates appearing at our own Preliminary examination in no way represents the number that we hope may come in for the license later on. With respect to the Law Committee, I can assure you that it has not been idle. It is the wish of everybody connected with the Society to put a stop to illegal compounding, and the Council is determined to do so. The most satisfactory intelligence that I have to give you is as to the increase of members. There are 123 members now as against 81 at the last annual meeting, showing an increase of 43; and indeed one might say 45, for two more have been nominated who will be elected as a matter of course. I would urge upon all licentiates that it is their duty to become members of the Society, so that it may be supported and supplied with the sinews of war for whatever it undertakes. I need not touch on the financial

affairs of the Society, as I will now call on our Treasurer, Mr. Hodgson, to submit his annual statement to you.

Mr. Hodgson: Gentlemen, I have once again to lay before you a financial statement. It has been my duty to do so for a good many years past, and I am sorry to say that I have never had to report so small a balance in hand as on the present occasion. The figures that your worthy President has given you do not exactly correspond with mine, because mine simply represent the money that has been received, while his include those persons who have entered the Society, but in respect of whom no money has yet passed. In this year 22 gentlemen paid the licence fees, which produced an income of £115 10*s.* In 1888 the number who paid the licence fee was 28, producing an income of £147. This year we had 46 Preliminary examinations, producing £96 12*s.*, as against 53 last year, producing £111 16*s.* It was remarked to me just now that the re-examinations would pull up that deficiency; but I do not find that that has been the case. In 1888 we had 8 re-examinations for the licence, producing £12 12*s.*, whereas this year we had only 3. In 1888 we had 3 Preliminary re-examinations producing £1 11*s.* 6*d.* This year we had 6 Preliminary re-examinations; but adding them together, the total of Preliminary and re-examinations for this year was 52 as against 56 in 1888. I find that the entire income derived from fees for the professional branch of our business, including £9 9*s.* paid for three licentiate apothecaries registered as pharmaceutical chemists, was £229 19*s.* this year, whereas in 1888 we had fees to the amount of £273 10*s.* 6*d.* In subscribers, however, we have had a substantial increase. Last year we had 60 subscribers, producing £63 to the funds of the Society; this year we have had 90, producing £94 10*s.* Adding £7 9*s.* dividends received, £4 8*s.* from the sale of Calendars, and £123 10*s.* 11*d.*, the balance with which you commenced the year, your total income for the year amounted to £463 3*s.* 7*d.* That has been applied as follows:—First in the payment of fees to your Examiners, £87. We returned a fee of 5 guineas; the salary paid to Mr. Ferrall was £52; for the reporting of our meetings £14 14*s.* was paid; and we had to make two payments of £20 each for the *Pharmaceutical Journal.* The rent of course is a standing item—£50 a year. Then we come to law costs. Messrs. Casey and Clays' bill for the Ballybay prosecutions amounted £60 4*s.* 5*d.* Travelling expenses of the President, Mr. Allen, and the Registrar, and some other outlay, made a total of £65 10*s.* 8*d.* for those prosecutions. Then Messrs. Clay and Close's bill of costs in connection with the promotion of the Parliamentary Bill—a separate item—came to £73 10*s.* Adding £13 13*s.* for travelling expenses and another item for sundry small expenses, the total of law costs in connection with the Parliamentary Bill came to £88 12*s.* 4*d.* An item of £4 5*s.* for printing that must come into the costs of that Bill, but which appears in a different part of the account, raises the amount to £92 17*s.*

Professor Tichborne: Does that include the last payment of ten guineas?

Mr. Hodgson; No, that is not in this year's statement. The entire year's expenses for the Bill amount to what I have stated. There is an item of £13 18*s.* 4*d.* paid for printing and staticnery to Messrs. Gunn and Cameron. The Registrar's account for sundries, including postage, expended by him and checked by me, amounts to £25 4*s.* A variety of odds and ends, including fire insurance, chemicals from the Apothecaries' Hall for the examiners, bottles and specimens, etc., raise the account for "sundries" to £35 9*s.* 9*d.* The final result is a balance of £10 0*s.* 2*d.* to come into next year's account, my account, which shows that balance, being in agreement with your bank book. You have in stock a sum of £248 3*s.* 1*d.*, and adding the balance of £10 0*s.* 2*d.* there was to your credit on the 1st of October a sum of £258 3*s.* 3*d.* You will therefore perceive that you are running your finances exceedingly close. At the establishment of the Society it was laid down by our then President, Sir Dominic Corrigan—and Professor Tichborne will bear me out in this—that if we are to be a prosecuting body it must be at the expense of those who are to be benefited by the prosecutions. The Society must undertake them and bear the odium of them; but you have no funds out of which you can pay for those prosecutions. It it all very well for gentlemen to say that they will subscribe a certain sum which they are sure will cover the amount. But suppose it does not? The expenses of your Ballybay prosecutions ran up to between £50 and £60. It has always been the policy of the Society to put down illegality, and no one has a more keen desire to do so than I have. But law is a very expensive luxury; and you have no funds to pay law expenses. It has been the policy of the Society hitherto that when parties give us information of a case of illegality, we insist, before taking active steps in the matter, on having from them a letter of guarantee that the Society would be put to no pecuniary expense in the prosecution. When we obtained that we took all the steps necessary to put a stop to the illegality and accepted all the odium of it. The parties who were proceeded against did not know who had put the machinery in motion; but we insisted on the guarantee. The Society is at the present moment out of debt; but it has very little to work on, and it would be a very unfortunate thing if you should have to sell out any stock for the purpose of meeting current expenses. I have often said that your residence here should be only temporary, and that it should be your ambition to increase your funds in order to be able to get premises of your own. But if you indulge in law it will necessitate the selling out of stock and remove to a distant period the chance of your getting out of these premises. I beg to hand in my account, which I believe to be perfectly correct.

Professor Tichborne moved that the Treasurer's accounts be accepted and adopted. He perfectly appreciated Mr. Hodgson's anxiety, but took a more hopeful view of the prospects of the Society than he did. The fact that they had nearly doubled the number of their members—the increase being from 63 to 123—was most encouraging. It of course meant that the Society and its Council had the confidence of the licentiates. And this great increase in the number of members had only taken place within the last two or three months, so that the financial statement for the past twelve months, although perfectly correct, did not exactly represent the financial condition of the Society. Again there had been an extraordinary expenditure during the last year. A tremendous sum had been spent in law expenses in connection with the unfortunate Bill. The Ballybay outlay he did not call unfortunate, for reasons which he would give presently. He thought they might almost congratulate themselves on having a balance, however small. For his part he had not expected that there would be any balance, and had feared that they would be obliged to sell out stock in order to wipe out those extraordinary expenses. They had not, however, had to do so. As to the Ballybay expenditure the case was an exceptional one. It was undertaken to assert a perfectly legitimate function of the Society, namely, the putting an end to illegal compounding, and there was not the slightest doubt that if they had failed in it they might just put up their shutters at once, metaphorically speaking, for then any man who carried on illegal compounding would have been able to snap his fingers at them. Therefore, even though that prosecution should have cost double what it did they would have had to go on with it. But they had succeeded, and had taught the local magistrates

a lesson. They had taught them a part of their business which they did not know, and they had established a precedent for them which they would have to follow in future. Therefore, that money was well expended. He quite agreed with Mr. Hodgson, however, that the expenses of these prosecutions should be guaranteed. They had not heretofore got the money, and it would be most injudicious to expend the little money they had. So far as he could see, however, what might be called the legitimate working expenses of the year had been only £130 or £140. The increase in the number of their licentiates would give them a larger area to work on in order to obtain increased membership of the Society. Therefore on the whole he thought the Society was in a wholesome condition.

Mr. Wells begged to second the motion. The report might at first sight appear a gloomy one; but still he thought he could endorse everything that had been said by Dr. Tichborne. If the law expenses were taken out of the expenditure the balance would be larger than it was last year. Still the Ballybay case, even if it had cost them all the money that they had, would have been worth that to them. The point that was decided in it was one of the greatest importance to the Society. When the Belfast prosecutions were undertaken, there would have been a lot of convictions had they had that ruling of the higher court. The Belfast magistrates held that according to their Act they should have had a register of chemists and druggists; and the prosecutions before them were thrown out on that point. The Ballybay magistrates took the same view. But when their decision was brought to the higher court the judges said that the law of the Ballybay magistrates was bad, and that the Society were not bound to have such a register; and that accordingly the magistrates should have convicted. If therefore the Society should undertake other prosecutions—and he hoped that they would have a good many more of them before the year was out—it would be done at much less expense. These magistrates in the country would not convict a man unless they could not help it. But now after the ruling of the higher court they would have to convict, whether they liked it or not. As to their Parliamentary business they got off very cheaply. It was money lost, no doubt; but he thought the majority of the gentlemen present would rejoice with him that the Bill was thrown out, and that the money was spent in getting it thrown out instead of passed. Their worthy Treasurer had alluded to the examination fees. A candidate rejected for the first time had a right to come in at a second examination without paying the examiner's fees; and that was the cause during the past year of their being considerably out of pocket, because they had to pay 30*s.* to the examiner in the case of each re-examined candidate, and during the year ended they had a considerable number of those examinations. The question was raised at the Council during the year as to whether they should not give up the *Pharmaceutical Journal*. He had been thinking a good deal over the matter, and he thought that if they were to give up the *Journal* and spend the money thus saved in prosecutions, the members of the Society would be better satisfied than they were at present. He did not believe that they would lose a member by such a change. It was for the members of the Society to say whether the proposal was agreeable to them or not. He thought that the licentiates of any neighbourhood where a prosecution was necessary ought to be very glad to band themselves together and come forward and give assistance in order to get convictions. As long as he should be on the Council he would vote for a certain amount of their income—if they should have sufficient means—being spent in prosecutions. He believed that it was their duty to prosecute in case of illegality, and that if they did not do so they would not have the support of the members of the Society.

The motion was then put and carried unanimously.

Mr. J. McCreery Hill said he wished to make a statement as the way in which gentlemen were encouraged to bring in new members. Some months ago he procured with some trouble several new members, and sent their names to one of the members of the Council, asking him to propose them while he seconded them himself. At the first meeting of the Council that took place afterwards that nomination was accepted; but at the next meeting, when the gentlemen should have been elected, they were renominated because he (Mr. Hill) was not a member of the Council. He asked how the President and Council got over the rule in the Calendar which said that a "Candidate for membership shall at a meeting of the Council be proposed and seconded by members of the Society."

Professor Tichborne: Were not those gentlemen elected members?

Mr. Hill: They were, but not for a month after they should have been elected. I am raising this point in the interest of members of the Society.

Professor Tichborne: The Council got over the difficulty the best way it could—you admit that?

Mr. Hill: Decidedly.

Mr. Hodgson said there was not the slightest intention of passing any slight upon Mr. Hill—quite the contrary—but the President pointed out that the first nomination was informal because Mr. Hill could not be a seconder, not being a member of the Council, and present at its meetings.

Mr. Hill: I certainly did not take it as any slight upon myself; but I think that the members of the Society should be allowed to have something to do with the election of members of their own body.

The President: I will read the two rules which bear on the subject. That as to "members of the Society" is—"A candidate for membership shall at a meeting of the Council be proposed and seconded by members of the Society, and the name and address of every candidate shall be inserted in the summonses for the next meeting of the Council, when the candidate may be admitted by a majority of votes."

Professor Tichborne: Of votes at the Council.

The President: The other rule is No. 13 of those relating to the meetings of the Council, and is as follows:—"Members of the Pharmaceutical Society when permitted by the Council may be present at its meetings, *but are not to take part in the proceedings.*"

Mr. Hill maintained that the members of the Society who succeeded in getting new members ought to have the credit of bring them into the Society.

Professor Tichborne: We could not make any rule which would clash with the original set, and I think it states that no gentleman who is only a member of the Society can vote at meetings of the Council.

Mr. Downes said if members of the Society were allowed to propose and second candidates for admission into the Society at the annual meetings it would deprive the Council of the veto which they at present had under the rule, for the purpose of keeping out objectionable persons.

Mr. Wells said that as he was the guilty party in this matter he would like to say a word or two. Mr. Hill gave him those names, and he handed them in with Mr. Hill as seconder, not having in his mind at the time the two regulations which bore on the subject. The President afterwards pointed out the informality, and he (Mr. Wells) withdrew the nomination. He believed that if the gentlemen had been elected upon it they would have illegally become members of the Society, and the election of members of the Council that night would have been vitiated. He could assure Mr. Hill that he would have been very glad to leave the matter as it was; and if members thought that it

was any advantage to them to have this privilege, the Council would think over the matter, but he did not see how they could get over the Act of Parliament, which prohibited members of the Society from taking part in the proceedings of the Council.

Mr. Hill: Gentlemen seem to have spoken of this as a personal matter, but I really do not take it as personal to myself at all. The two rules contradict one another, and you want to do away with the one that I hold to.

Mr. Wells: If you take the two rules together the matter is very plain.

Mr. Dawson Tate said he concurred in the opinion that the two rules should be read together.

The President (to Mr. Hill): Would you like to give a notice of motion on the subject?

Mr. Hill: I would, decidedly.

Mr. Wells: It would be better to address a letter to the Council, and we can discuss it there.

The President moved that the marked thanks of the Society were due to Mr. Hodgson, for the care and attention which he had bestowed during so many years on the financial affairs of the Society.

Professor Tichborne said he had much pleasure in seconding the motion. Mr. Hodgson had stood to the Society in times when it wanted a helping hand.

Mr. Beggs had great pleasure in supporting the motion. They needed such a man as Mr. Hodgson to conserve their resources. He was sure all present would record their confidence in their worthy treasurer.

The motion was passed unanimously.

Mr. Hodgson, in responding, said he had not anticipated any vote of thanks, but he had only to sincerely thank Professor Tichborne and his other friends who had spoken to the resolution, as well as the gentlemen present who had voted on it. He worked hard with Professor Tichborne to get the Society's original Pharmacy Act: and from that time to the present he (Mr. Hodgson) had taken an interest in the working of the Society, and he believed he was the only Treasurer it had ever had. His ambition had all along been that the Society should have premises of its own in which it could carry out educational and scientific arrangements and have a library; and if ever the finances should become sufficiently strong to enable it to attempt to carry out that object he would gladly contribute towards a fund for the purpose. He felt very much the confidence which had been expressed in him; and as long as he remained Treasurer he would do his best for the interests of the Society.

Mr. Wells said he felt it only right to state that during last year, on an occasion when some members of the Council were looking at houses to see whether they could take one, Mr. Hodgson went to the bank and offered to become security for a loan to the Society of a couple of thousand pounds, and the secretary of the bank informed him that the money would be given.

Professor Tichborne having been called to the chair,

Mr. Wells said he had great pleasure in moving a vote of thanks to the President. On a recent occasion when the Society was in a position of very great difficulty that gentleman came to the rescue and took the reins. When an officer ran away from his charge his men generally got disorganized, but though several members of the Society ran away, still they found that they had an able man in Mr. Charles Evans. Mr. Evans's name had been associated with pharmacy in Dublin for a great number of years. During the short time that they had had the honour of having him in the chair as President they had been in no way disappointed. He had done well for the Society, notwithstanding his short experience, under difficult circumstances, when so many old members of the Council had left; and he hoped that after they should have put him in the chair for the coming year he would be spared to work for them as he had done.

Mr. Tate said he had great pleasure in seconding the motion.

Professor Tichborne in putting the motion said no praise of Mr. Charles Evans was needed from him. Every member of the Council had been struck by the rapid manner in which Mr. Evans had mastered the details of the business of the Society; and he (Professor Tichborne) must confess that in his mind he was one of the most efficient Presidents the Society had ever had. He was sure the vote would pass by acclamation.

The President said he could only thank them for the too flattering manner in which they had spoken of him. He was very pleased that his services had been of use to the Society.

The proceedings then terminated.

October Preliminary Examination.

The following are the names of the candidates who were successful in passing this examination:—Messrs. Henry McNeil Gordon, Thomas Frederick Bell, William Redpath and James Fitzgerald. Four were rejected.

Provincial Transactions.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

The opening meeting of the session was held in the Waterloo Rooms, 77, Wellington Street, on the evening of Wednesday, the 9th inst., at 9.15, Mr. James Robb, President, in the chair. There was a large attendance.

The minutes of the last meeting having been read and approved, the Chairman said he had a very pleasant though somewhat unnecessary duty to perform. Mr. Kinninmont was too well known to require any introduction to a pharmaceutical audience in Glasgow or indeed in any part of Scotland. He had much pleasure in calling on their esteemed Honorary Vice-President, Mr. Alexander Kinninmont, F.C.S., to deliver

The Inaugural Address.

Mr. Kinninmont said he had much pleasure in meeting his audience, and in expressing an earnest desire for the prosperity of their Association. He was carried back in thought to the time when he himself was an assistant. That was now a long time ago, and he saw before him one who was an active member of the Assistants' Association of those days. He referred to his colleague in the Honorary Vice-Presidency, Mr. John McMillan. When asked to deliver an address at the opening of their session he felt that to do so was to undertake a rather formidable duty. He had always had a feeling of aversion to old men coming forward too much in meetings of younger men. He thought there was a risk of their seeking too much to play the part of giving advice, and their presence he always felt was apt to act as a kind of restriction on the free expression of opinion. He had an impression therefore that it would have been better had they been addressed on this occasion by a younger man, having a wider vista before him. He would also have to claim their indulgence. He had, as some of them knew, just lost an assistant who, after fifteen years of faithful service, had been suddenly cut off after an illness of two hours. This had given a shade of gloom to his thoughts, from which he felt it impossible to tear himself away. While personally he would have liked to see a younger man in the place he had been called to fill, he had great pleasure in undertaking the duty they had laid upon him. And, of course, there were many things that an old man could say with advantage. To the eye of an old man the flight of time appeared to be ever increasing in speed. The years were like a whirlpool

of concentric circles which got smaller and smaller till they reached the centre and disappeared. Old men had got clear of the natural impatience of youth. They had a broader view of life and could see the effect of things more fully, and while they felt that for themselves the future had not much to disclose, they could hold out a picture of hopefulness and encouragement to younger men. It was now about forty-four years since he entered the drug trade, and looking back he could testify that the condition of things then was a very great deal worse than at the present day, and any improvement that had taken place had been largely due to the work of just such an Association as the one they were seeking to establish now. He was struck in listening to the address of Mr. Umney, at the recent Conference at Newcastle, to observe that he attributed the great advances made by pharmacy in recent years to the work and influence of the Conference. While not wishing to deny due honour to the Conference he felt that the work of local associations had also had a most important share in helping forward the good work. He was not going to indulge in praise of bygone times or assume the role of a *laudator temporis acti*. The old Association to which he had already referred did good work in its time, and it would rest with them to carry that good work on. The old Association originated in an agitation for early closing which met with considerable success. Before that time the community of chemists' assistants was in a very disintegrated state. There was a prevailing distrust of one another, and something very like a feeling of hostility. But when they met together in their Association they discovered that they were all very good fellows indeed, and they soon became very sociable. An early outcome of that Association's work was the appointment of a price list committee and the drawing up of a price list which was a very great benefit to the trade. He regretted that that price list was at present in abeyance, but he trusted it would soon be revived again. He was very pleased in looking over their syllabus to observe that they had been able to arrange for a series of interesting papers by themselves. He would strongly advise them to aim at supplying all the material for their meetings themselves. It was all very well to get lectures by specialists from outside, but it was rather an awkward thing to bring a public lecturer to address an audience of perhaps ten or fifteen people. One great object of their Association was to get the talents of the members for observation developed, and this could best be done by the course he suggested, and he trusted they would stick to it. They would perhaps allow him to give them one or two hints from his own experience in connection with the old Association. He would suggest that they should have no platform or pulpit, but that they should arrange the seats round the room and let each member take a part in any discussion that arose. Lord Bacon had said that there was the greatest possible difference between a long table and a round table, because with a long table a few at one end were apt to rule everything, whereas at a round table all were on an equal footing. They should endeavour to preserve an equality in their meetings, and he thought this might be best attained in the way he suggested. He would also advise them to take an interest in and support what he would call the politics of the trade. The old Association did good work in that connection and had considerable influence in the shaping of pharmaceutical legislation. At the present time they were suffering from what he could not but regard as a complete misinterpretation of the Pharmacy Act of 1868. The principle of that Act was to regard the master as alone responsible, but in recent decisions that principle had been ignored, and it was asserted that any man could carry on a drug business if only he were a member of a limited company. With all deference to the House of Lords, he submitted that its judgment was wrong and utterly beyond the intentions of the Act. It was now said that all assistants must be qualified. The application of such an interpretation would involve a great deal of difficulty. Had such an interpretation been put upon the Pharmacy Bill when it was before Parliament it would have been scouted out of existence. He did not believe such a principle could be carried out in practice. It would give rise to an agitation that would probably lead to a repeal of the Pharmacy Act altogether. He would be very sorry to see such a result, for there could be no doubt that on the whole the influence of the Pharmacy Acts on pharmacy had been beneficial, and had given a status to the profession which it would not otherwise have possessed. It would rest with them to take any action that might be required to defend the legitimate interests of chemists and druggists. He had now occupied the time allotted to him, and would conclude by again expressing the pleasure it had given him to meet them. The senior Association was at present in that condition of suspended animation with which it seemed to be periodically affected. He trusted it would, ere long, revive again, but the main part of the work would always be done by the assistants. He believed the library of the old Association was still in existence, and he trusted they would be able to recover it and get it into working order again. He had had more prepared and had begun not knowing whether it was to turn out a song or a sermon. He was afraid the feeling of sadness from which he suffered had tended to give it much of the character of the latter, but they would excuse him, and he cordially wished them all prosperity.

Mr. Rutherford Hill, Edinburgh, having been called upon, said he could cordially congratulate the members of the Association on a very auspicious beginning of their session and on the very interesting and suggestive address to which they had just listened. Should they feel disposed to act upon the suggestion to devote attention to pharmaceutical politics he would like to point out the necessity for making sure that they knew and accurately understood the existing Pharmacy Acts. He had been very greatly surprised to find that a great many chemists had never even seen the Pharmacy Act of 1868, and very few indeed were intimately acquainted with its actual provisions. They must have noticed that many who discussed these subjects very freely, and even writers in the trade journals, laboured under the fatal disadvantage of not knowing or misunderstanding what they were talking about, and that was a great pity. He would also strongly urge them to make the utmost possible use of the little spare time they had. He found that many assistants were doing nothing at their studies, and their unfailing excuse was a fruitless and melancholy complaint about long hours. Long hours were a heavy burden, but many men had risen to eminence in spite of them.

Mr. John McMillan, Honorary Vice-President, congratulated the Association on the excellent address with which the session had opened, and trusted Mr. Kinninmont might often be seen at their meetings.

Mr. Archibald Paterson said he had been asked to make a few remarks about the old Association, which was one of his earliest recollections in pharmacy. Their first meeting place was in the Angus Temperance Hotel in Argyle Street, where an enthusiastic band of young men spent many pleasant and profitable evenings under the genial presidency of Mr. Kinninmont who, as a rule, occupied the arm chair. Their meetings were characterised by a great amount of freeness. They had papers on a great variety of subjects. One

he remembered by Mr. Macdonald of Virginia Street, another by Dr. Moffat, and another by the original R. T. Dun. Their next meeting place was in the Athenæum, where they met for several sessions. Then they removed to the Mechanics' Institute, where many pleasant meetings were held in the laboratory of Dr. Moffat, who had become famous as the inventor of the ammoniophone. Travelling eastwards they ultimately found a resting place in the Andersonian College. It was there that they first procured a materia medica cabinet and a library. They had regular courses of lectures on chemistry and also a course of lectures on botany, with most interesting Saturday afternoon excursions under the able and kindly guidance of the late Mr. Hennedy, and then they had their grand annual reunion, which generally took the form of a soirée, a kind of entertainment for which Glasgow was justly famous. He remembered on one occasion Mr. Stanford, of potassium iodide fame, told a striking story. A gentleman was passing along a London street when he observed an excited crowd. Pushing his way among them he discovered the cause of the crowd to be two fighting dogs. Each had got a firm hold of the other and neither would let go. He quietly took from his pocket a small snuff box, and put a small pinch on the nose of each dog. They instantly let go to get a good sneeze and the gentleman quietly repocketed his snuff box and walked away, making the significant remark "Knowledge is power." They had been hearing to-night what knowledge was, and his advice would be go on, persevere and gain that power which knowledge brings, especially to the chemist. He wished them every success, and he hoped they would speedily obtain possession of the materia medica cabinet, the microscope and the library which belonged to the old Association.

The Chairman proposed a vote of thanks to Mr. Kinninmont and the other speakers, which was cordially awarded with acclamation.

Mr. Kinninmont in returning thanks said he would like to give them a single instance of how one's future might be influenced by a chance sentence. He was reading Mr. Ince's paper on "Study," and was struck by the remark that by devoting one hour to study daily for three years they could acquire all the knowledge they required. He had for a long time thought of learning French and, acting on the suggestion, he began that very day and continued till he had acquired a serviceable mastery of the French language. In study not to advance was to go back, and he strongly advised them to keep steadily at it, trust to their own resources, and they would have a successful future.

The meeting then closed.

LIVERPOOL CHEMISTS' ASSOCIATION.

The sixth general meeting of the fortieth session of this Association was held at the Royal Institution on Thursday evening, October 10. The President, Mr. A. H. Samuel, F.C.S., in the chair.

The minutes of the previous meeting were read and confirmed, and the following donations announced:—'The Proceedings of the Liverpool Geological Society,' 30th Session. 'The Journal of the Liverpool Polytechnic Society,' 50th session. 'The Proceedings of the Liverpool Naturalists' Field Club,' 1888. Volume iii., no. 4, of *Ephemeris*, from Dr. Squibb, Brooklyn. 'Bulletin of the Chemical Society of Washington,' No. 4. 'The Twenty-fifth Annual Report on Alkali, etc., Works,' by Mr. A. E. Fletcher, Chief Inspector. 'The Twenty-fifth Annual Report of the Alumni Association of Philadelphia,' and the *Pharmaceutical Journal*, from the Society.

A vote of thanks was accorded to the respective donors, and the President said he should be glad to hear any miscellaneous communications that members might bring forward.

In response, Dr. Symes said there were two matters he wished briefly to mention. In the recess Dr. Rentoul had communicated with him, and possibly with some other members of the Council, concerning a matter in which he had much interested himself, viz., the relation of the present hospital system to medical practice and chemists with proposals for reform. He thought it might be well to consider whether that gentleman should not be invited at an early date to put his views before them in the form of a paper or otherwise. The other matter was the concluding part of the Pharmaceutical Council's proceedings in London on July 2, as reported in the *Pharmaceutical Journal*, and from which he gathered that it was intended to prosecute a young man, 21 years of age, a chemist's assistant, for selling a packet of rat poison, he not being registered. He would not anticipate what form the action would take, but he thought it tended to violate the principle of personal qualification and responsibility on the part of the proprietor which was recognized when the Act was framed. He knew there was much to be said on both sides of the question, and would not therefore ask the members present to go into the matter that evening, when there was other business on hand; but he thought it unfortunate that being a new departure, and of considerable importance to the whole trade, that it should have been dealt with by the Council in secret.

Mr. A. C. Abraham said he was opposed to the decision of the Council of the Pharmaceutical Society, and thought the subject worthy of the attention of this Association, and hoped it would be fully discussed by it.

The President said both the subjects brought forward by Dr. Symes were of great importance to the members of the Association, and he promised to bring them under the notice of the Council.

The President now called upon Dr. Symes to exhibit one of Bracher's automatic stills (improved form) in operation.

Dr. Symes said that he exhibited the original form of this apparatus at a meeting of the Association about a year ago and there were some criticisms on it and some suggestions for its improvement by Mr. Conroy, Mr. Abraham and others. These he had communicated to the maker, and by adopting them and the addition of a tap and syphon arrangement it had been made a really excellent piece of apparatus, and as nearly automatic as was practicable. He thought it due to the Association to show the members the result of their useful and practical suggestions. The still was shown working, and was afterwards taken apart from the condenser and explained in detail.

A short discussion followed, and a vote of thanks, proposed by Mr. Conroy and seconded by Mr. A. C. Abraham, was heartily accorded to Dr. Symes for bringing forward a matter of such practical interest.

The President then said that the next subject to come before the meeting was the following paper on—

Enamelled Cooking Vessels.

BY EDWARD DAVIES, F.C.S., F.I.C., ETC.

The earliest cooking-vessels were no doubt earthenware, and in many respects these are the best for subjecting the material employed to a gentle, prolonged heating; in fact, stewing. There is no fear of metallic contamination, and the excellence of the French pot-au-feu is in a great measure due to the earthen vessel in which it is made. Every housewife knows how much better for making a really good cup of tea is the old black earthenware pot than its showy silver rival. But pots have their defects; they cannot be well used for boiling, and their proverbial fragility excludes them where they would, but for this, be welcomed. So metallic vessels came into use, and considerations of economy reduce the metals to iron, brass and

copper. If silver were only cheap no metal could compare with it on account of its freedom from liability to oxidation, its insolubility in the acids used in cooking, and the facility of cleaning it. But at present we only occasionally hear of its use in this way, when a silver grid is advertised as an attraction to a chophouse, or in some very aristocratic cookery-book we are directed to boil a ham in champagne in a silver pan. So the baser metals are forced upon us, although iron communicates to any acid body a bad colour and an inky taste, and copper and brass, if not kept scrupulously clean, may communicate poisonous properties to food prepared in them, especially if the food is left in the vessel.

It is therefore not strange that efforts should have been made to combine metals with pottery or glass, so as to unite the advantages of each, the purity of the earthenware and the non-frangibility of the metal. Rather is it strange that as the art of enamelling on metals has long been known, the application of it to cooking vessels should be so recent. Beckman in his 'History of Inventions' makes no mention of it, although he describes enamel. The first mention of the application of enamel to cooking utensils that I can find, is in Ure's 'Dictionary,' from which it appears that an Englishman, Dr. Samuel Sandy Hickling, took out a patent in 1799 for this purpose, which was practically carried out, but given up for want of encouragement. Another patent was taken out in 1839 by Thomas and Charles Clarke, but they were unable to sustain it, and from that time the art has extended and improved, though it is yet only used to a limited extent.

An enamel is in principle a glass, or fusible porcelain, melted on the surface of some less fusible material, and is generally opaque. There are many requirements necessary in a perfect enamel. 1. It should be fusible at a moderate heat, to prevent fusion or distortion of the base. 2. It should adhere firmly to the surface of the base, so that it should not be detached by the blows to which the article may be subjected, or by heating and cooling. 3. It should not be acted on by acids or alkalies, at least such as may fairly be expected to be met with in cooking, such as the acids of fruit, sour milk and vinegar, or very dilute solutions of carbonate of soda. 4. It should contain no poisonous ingredients, so that if the third requirement be not perfectly complied with, the fancied security may not be a source of danger.

These conditions are not easily combined, for fusibility generally implies liability to be acted on by acids, and may most readily be attained by the use of oxide of lead, which infringes the fourth condition. Nevertheless the manufacture of enamelled vessels has been successful in fulfilling these conditions to a very satisfactory extent, and although doubt has been cast upon the freedom of glazes or enamels from arsenic, and a suggestion has been made that the arsenic may find its way into the food cooked in enamelled vessels, I hope to show that both of these assertions are unfounded, and that such vessels as are in the market at present are free from suspicion on this score. The making of enamels is a subject which has interested me for a long time, and for six months I was engaged in the attempt to coat moulds for making sugar loaves. From various causes the attempt was abandoned, but at the time, I used every effort to obtain information on the subject, and can therefore speak from more than mere book knowledge. Enamelling of cooking vessels has been practically confined to the protection of cast or wrought iron. Copper or brass are generally used as they are, or are tinned or silvered, so that I shall confine my remarks to iron vessels. The first operation is to obtain a clean metallic surface, as the adhesion of the enamel materially depends on this. Sulphuric acid is usually employed, and it should for this purpose, as for trimming or galvanizing, be free from arsenic, as this deposits on the iron and injures the surface, and also makes the hydrogen evolved poisonous from the presence of arseniuretted hydrogen. The articles are then scoured, washed in clean water, and are ready for the application of the enamel.

This is made of many very various materials. The aim is to produce a fusible glass or porcelain, and all the materials used for these purposes are available for the enamel maker. Silica and boracic acid or borax furnish the acids and soda, potash, alumina, lime, and oxide of tin the basis. The enamel is therefore a more or less complex silicate and borate of potassium, sodium, aluminium, calcium and tin. The oxide of tin is to make the enamel white and opaque. This effect can be produced by phosphate of calcium and cryolite, but not so well.

Every manufacturer has his own formula and proportions, and to give a long list of formulæ would be of very little use or interest. I will therefore give an example of an enamel, being the first proposed in Hickling's patent, and being the latest which I have seen.

Hickling's composition consists of—

Calcined flint	6 parts.
Litharge	9 ,,
Borax	6 ,,
Argillaceous earth	1 ,,
Nitre	1 ,,
Oxide of tin	6 ,,
Potash	1 ,,

or

Flint	4 ,,
Cornish stone	1 ,,
Nitre	2 ,,
Borax	8 ,,
White marble	1 ,,
Argillaceous earth	½ ,,
Oxide of tin	2 ,.

Reichel's composition—

Glass	16 ,,
Fluorspar	8 ,,
Borax	12 ,,
Nitre	4 ,,
Oxide of zinc	1 ,,

Although I have seen a great number of formulæ, I have not met with one in which arsenic entered.

Whatever composition is taken must be finely powdered, mixed, fused, ground when cold, sifted, and levigated with water. It is then made into a pap with water or gum water. This is brushed or poured over the vessel, dried and fused in a muffle.

The Prussian Government prohibited the use of lead or its compounds, many years ago, and so far as my experience goes it is not used in those of German make sold in Liverpool.

In order to ascertain what action would be exercised on enamel by cooking food in the vessels it is clearly not fair to use stronger acids than would in practice be met with. I am sorry that I have not had time to make more experiments, but I give the results which I have obtained.

I have used a 1 per cent. solution of lactic acid, and a 1 per cent. solution of acetic acid. To see if stronger acids would destroy the enamels, I have also tried the effect of a 1 per cent. solution of HCl and a 4 per cent. solution of HCl. The anhydrous acid is understood in each case. The pans used are, one bought in Bold Street, German make; one, a cheap one, of German make; and one of English make, Kenrick's. There is also a small dish, also of English make.

I give a table showing the effect.

	1 p.c. Lactic.	1 p.c. Acetic.	1 p.c. HCl.
Best German	Trace of tin	Nothing	Much tin.
Cheap German	2 grs.	Nothing	Not tested.
Best English	Nothing	Nothing	Not acted on.
Bad English	Much lead	Lead	Not tested.

The best German above was tested with 10 per cent. HCl. 10,000 grams of the dilute acid was boiled for an hour in the pan, loss by evaporation being supplied. 5·44 grams of SnO_2 was dissolved, but there was only a slight coloration of copper in Reinsch's test for arsenic. I could not get distinct crystals, but I believe that there was a faint trace of arsenic. The amount was far too small to have any perceptible effect, and it could only be got at by the use of strong acid. None of the other tests showed the faintest trace of arsenic, so that there need be no fear of danger or of the slightest contamination with arsenic in using these enamelled articles.

Whether tin is injurious in the minute trace taken up from the good German make is a doubtful point. I regret that I have not had time to try the effect of citric and tartaric acids, and also of fruit. For non acid liquids all may be used safely, but there is no doubt that the best of the four is Kenrick's. The German are better-looking and lighter, but the enamel is more attacked by acids than Kenrick's. The other English enamel is very bad, yielding lead freely to weak organic acids.

We find from this examination that arsenic, if present at all, is in the faintest traces, and is not removed by dilute acids. That oxide of tin is soluble in these dilute organic acids in the foreign enamels, but only slightly so in the better quality. That there are still enamels containing oxide of lead, the use of which for cooking vessels should be prohibited.

A lengthy discussion followed, in which Dr. Nevins, Messrs. M. Conroy, A. C. Abraham, A. A. Barrett, Hocken, Ward, and the President took part, and a vote of thanks, proposed by Mr. M. Conroy and seconded by Mr. A. C. Abraham, was accorded Mr. Davies with acclamation.

Mr. Davies thanked those present for the manner in which they had received his remarks, and replied to the various points raised in the discussion.

The President said he would now ask the meeting to appoint a President for the next session, whereupon it was proposed by Mr. M. Conroy, seconded by the President, supported by Mr. E. Davies, and unanimously resolved:—"That Dr. Symes be elected President for the ensuing session."

Dr. Symes thanked the gentlemen who had in such kind terms moved, seconded and supported his election, and the meeting for the honour it had done him. Previously he had on two occasions served them as President, and he trusted on the present occasion to fill that office to the best of his ability, but he would remind them that he had very little time at his disposal, and that there were others who had more and could fill the office well.

This concluded the business, and the meeting terminated.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The annual general meeting of the above Association was held in the rooms of the Chemical Club, Victoria Hotel, on Wednesday, October 9, Mr. W. Wilkinson, Vice-President, in the chair.

The minutes of the last meeting having been read and confirmed, the reports of the Council and Treasurer were read and adopted, the Treasurer's report showing a balance carried forward of £13 12*s.* 4*d.* to the General Fund, and to the Library Fund of £5 18*s.* 8*d.*

Mr. Harold Woolley moved, and Mr. Lane seconded, that the officers of last session be re-elected, with the exception that Mr. Arrandale was placed on the Council, vice Mr. Hart, resigned.

The following form the Council for the ensuing session:—President, Mr. W. S. Brown; Vice-Presidents, Mr. W. Wilkinson, Mr. F. B. Benger; Treasurer, Mr. G. S. Woolley; Hon. Secretaries, Mr. W. Elborne, Mr. H. Wilson; Hon. Librarian, Mr. H. Wilson, together with Messrs. Boor, Botham, Robinson, Midgeley, Stones, Slack, Westmacott, Harold Woolley, Kemp, Arrandale and Bowden.

Opinions were expressed by various members that a dinner, smoking concert or conversazione would tend to promote good feeling and the welfare of the Association. The following were appointed a Committee to decide what form the conviviality should take, Messrs. Kemp, Smith (Pendleton), Bowden, Lane, Harold Woolley and Wilson.

At the close of the meeting several papers were promised for the session, and it was hoped the meetings would be very successful.

LEICESTER AND LEICESTERSHIRE CHEMISTS' ASSOCIATION.

The second annual prize distribution and ball of this Association took place on Thursday evening, the 10th inst., at the Masonic Hall, Halford Street, Leicester, the Hall being crowded, including the Mayor of Leicester (Alderman E. Wood), the Mayor-Elect (Dr. Lankester), J. G. F. Richardson, Esq., J.P. (President of the Association), Drs. Bennett, Bremner, Douglas, Lewitt, Peake, Pope, Mason and Neale, Messrs. Broof, S. F. Burford, F.C.S., E. H. Butler, Cleaver, J. J. Edwards, Harvey, Hindle, W. Rowe, Sturgess, Thirlby, Wilby and G. Woolley; there was also a large attendance of ladies.

Letters of apology for absence were received from Dr. C. H. Marriott, Rev. J. Went, M.A., and Rev. E. Atkins, B.Sc.

In opening the proceedings, the President expressed his pleasure at having the Mayor present with them that evening, and that although he had so many engagements and had just been presiding at a meeting with which they were closely connected, viz., the Ambulance Society, he had been good enough to honour them with his company. Major Richardson continued: It is not my intention to give any special address this evening, but just to take the business in the simplest possible way. I should like to say before I present the prizes how delighted the Committee is that these prizes have had such very good results in bringing the young men into closer connection with their technical work than they have been in former years. The young men who have contested for these prizes have been singularly proficient in their different subjects. The winner of the first prize answered 99 questions out of 100, while in practical chemistry the first in the class positively answered 100 questions out of 100. I can only urge upon the young men, as I did last year, that we shall be perfectly satisfied if they will only attend to the work given them and to the work of technical instruction, which is so necessary. As a practical man of thirty years' experience, I may say that this is the golden part of your life, when you can make great progress in your work. I wish I could have had the opportunities you have, and I shall be glad to see you take advantage of them. I hope every young man connected with chemistry in Leicester will make it his duty to join the class. I am very glad that the Town Council have assisted us in our work by giving a magnificent botanical garden in the Abbey Park, which I believe to be one of the most successful in England. Not only is it a great help to us and those who study botany, but it gives satisfaction and pleasure to those who visit the park. The breach between pharmacy and the medical profession is becoming less and less every year, and I hope that it will always be the case that pharmacists will approach the medical profession with every desire earnestly to win its confidence, and that the profession will give pharmacists all its help in assisting us to carry on their work. There are political matters into which I should like to have gone if I had

had more time, but I may say that it is the intention of the Council of the Society to arrange meetings for members of the trade, at which we hope to discuss trade subjects which will probably be more interesting to the employers than to the young men.

Major Richardson then proceeded to distribute the prizes as follows:—Chemistry of the Pharmacopœia: (1) B. Lewitt; (2) A. P. Eldred.—Practical Chemistry: (1) F. O. Beale; (2) W. G. Kinton.—Botany: B. Lewitt and A. P. Eldred were equal in this subject, and received books of equal value.

The Mayor thanked the Chairman for his kind expressions, and said: I will refer to that part of chemistry which is used so much in our manufactures. It is impossible for anyone except those connected with the facts to realize the national loss we have sustained because chemistry has not been made a greater study of by our young men, and especially the branch of dyeing. The aniline products from our gas works have had to be sent to Germany to be made into dyes, and it is a pity that a country like this should be so far behind. Yarns spun in Leicester have to be sent to Germany to be dyed because we do not understand the process in England. It is the duty of young men who have chosen chemistry as their study to give this matter their attention. In the higher branches of chemistry there is a wide field for the study and research of our young men rising up into life. I trust it may be one of the objects of your Society to grapple with the subject. Our technical schools are doing something in this matter, but their power is limited. Only a month ago they were entirely dependent upon voluntary subscriptions for support, until a Bill came before the Parliament enabling the ratepayers to contribute, where demanded, towards the support of technical schools. I hope you will encourage the study of the higher branches of chemistry. I should also like to recommend you to read Sir Henry Roscoe's Address on Monday night. You will find material for your reflection and matter which cannot be but profitable. I hope that your Society may prosper, and that every student will distinguish himself, and one and all try to make his particular calling in life prosperous and successful in the highest degree.

The President said he had a very pleasing duty to perform, which was to present a slight memento to their late Secretary, Mr. Edwards, who for many years had been one of their most painstaking and efficient officers. He had seen the Society and stuck to it through its good and bad days, and they were now celebrating their second year since the resuscitation from the old Society. There was no one who had worked with greater effort and love for the cause than Mr. Edwards for fourteen or fifteen years, and this memento was to show their recognition of his work. The President then read the address as follows:—"Mr. James John Edwards, chemist by examination of the Pharmaceutical Society of Great Britain, Leicester.—We, the Council, members and associates of the Leicester and Leicestershire Chemists' Association hereby desire to recognize the zeal and interest which you have so long manifested for the principals and students connected with pharmacy in this town, and especially your services as Honorary Secretary of the above Association since its re-formation in February, 1886, in which capacity you have in no small degree contributed to its present prosperity. With the accompanying testimony of our esteem we offer our sincere wishes that you may long be spared to enjoy the respect of those you have so ably served; and that the great Disposer of events may bless you and yours in a continued period of health, happiness and prosperity. Signed on behalf of the Association this 10th day of October, 1889. Jno. Geo. Richardson, President. J. H. Shepherd, Hon. Secretary."

The address was illuminated and tastily designed, headed with the arms of the Pharmaceutical Society of Great Britain, and framed in oak. The "accompanying testimony" referred to in the address was a very handsome silver mounted cruet stand, the inscription on which read "J. J. E. from the L. and L. Chemists' Association."

Mr. Edwards assured his hearers from the bottom of his heart that it was no hypocrisy to say that was the proudest moment of his life. He never thought one day to be surprised with an event like this. He remembered the time when the young men managed the whole affairs of the Society amongst themselves. Mr. Clarke, the treasurer, stuck to them through thick and thin until they found they could not keep on any longer. In the moment of despair they sought the services of their worthy President, and he met them in a fair and liberal spirit, and they were grateful to him for it. Speaking to the students, Mr. Edwards said they were always students throughout their lives, because there was so much to be done and the field of research was so wide and the harvest still ungarnered and ripe. There were so many things to be done in the work and until they grew old and passed away they would have to continue at it in the same way. They had one cause in view, and that was the good of the young men, and no one could estimate the good that had been done by the Society. He had now withdrawn from office, but hoped the affairs would go on in the same way as in the past. Some people said societies like theirs were trifles, but trifles went to make perfection, and that was what they all wished to attain. The success of their class was simply because the young men in Leicester were determined to make the most of the means at their disposal, and instead of aspiring to obtain books and apparatus they made the best of what they had. Nothing could be done without hard work, and there was no royal road to chemistry.

> "The heights by great men reached and kept,
> Were not attained by sudden flight;
> But they, while their companions slept,
> Were toiling upwards in the night."

Dr. Lankester, rising to propose a vote of thanks to the President, said he was very pleased to see such proofs of the prosperity of the Association, believing the value of it to be so great. The great success of this Association seemed to be due to a great extent to the fraternal feeling between its members, to the respect in which they held the search for knowledge, and also very largely to Major Richardson's services. He was attached to it and helped it in every way he possibly could, and it must be a source of pleasure to him to see its success, the increase of members, and the interest the members took in it. He proposed that their best thanks should be given to their President.

Mr. E. H. Butler had very great pleasure in seconding the vote of thanks, and said, having been connected with the Association from its first days, he knew that it was to Major Richardson's efforts since its resurrection that its advantages and success were mainly owing. Had it not been for the helping hand he gave to them, they would not be in the position they were that evening. It was gratifying alike to the students and to the subscribing members to see the position the Society at present held.

The vote was then carried by acclamation, and

Major Richardson said in the success of the Society he was amply repaid for his efforts. All he wanted was to see the young men take advantage of the privileges laid before them. The Mayor had been speaking of the want of energy among chemical students. Perhaps he did not know how heavily handicapped they were in England. He (the speaker) thanked them for their vote, and as long as they wished him to stay in the position he now held he would be very happy to remain their President.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second meeting of the session was held on Thursday evening, October 10, in the Association Rooms, 74, Commercial Street. There was a large attendance. The Secretary read the minutes of the previous meeting, and these were duly confirmed.

The President (Mr. John Forsyth) then delivered an address to the members. After thanking the members for the honour they had done him in electing him to that important office, he stated that they must bear with him should he not come up to their expectations, and he would endeavour, as far as lay in his power, to further the interests of the Association. He then went on to speak for a short time on the work of the Association in general, and said he hoped that the splendid start they had made would be the means of encouraging them on during the coming session. He hoped that by acting up to the advice and suggestions thrown out at the Inaugural Meeting, coupled with what would be brought before them during the winter, they would feel at the close that much had been gained. He trusted all would derive some advantage from the Association, and that every one would aim at helping his neighbour as far as possible. Referring to the musical evenings, he was sure they would prove a success. They all felt in want of a little relaxation from the ordinary routine of work, and these evenings would prove a pleasant and harmless source of amusement, and at the same time they would be the means of keeping up a more friendly feeling amongst the members. He finished up by asking the members to try and keep up the attendance at the meetings as much as possible, also to take a lively interest in the work done.

On the motion of T. C. Henderson, seconded by Mr. W. Main, and supported by several members, a hearty vote of thanks was awarded to Mr. Forsyth for his address.

The Secretary then gave full particulars regarding the prize competitions, and intimated that the papers for the apprentices' competition must be in by November 28, and the "Progress in Pharmacy" prize papers are to be handed in not later than January 16, 1890.

A letter was read from Mr. Wm. G. Lamont offering to take up classes for the Preliminary Examination, provided a sufficient number of members wished to join, and asked the use of the room two nights a week for that purpose.

On the motion of Mr. W. McD. Skinner the request was unanimously granted, and it was also resolved that the sum of one guinea be given to Mr. Lamont to form two or more prizes to the students who make most progress.

The next meeting of the Association will be held on Thursday evening, October 24, when a paper entitled "Notes on a few Medicinal Syrups" will be read by T. C. Henderson.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The first meeting of the above Association for the new session was held on Thursday evening, the 10th of October, at the rooms, Great Russell Street, when the President, Mr. T. A. Ellwood, delivered the following—

Inaugural Address.

Gentlemen,—The connection I have had with your Association for the last three or four years I did not at all think justified your Executive in electing me to fill the honourable position of President, but as I had allowed my name to appear as a candidate for the Council, I could not refuse to fill any position or office in which I was subsequently placed by them; and really, after all, the success of an Association does not depend so much upon its President, as it does upon the united and individual efforts of its members. Hence, gentlemen, I must trust to your hearty support and co-operation in making the ensuing session as successful as former years have been; to me the otherwise arduous task will then prove a pleasure. If we thus work together in unity we shall not only achieve an equal success with previous years, but shall surpass them, and retain the characteristic title of a "progressive Association."

The Association has now entered its teens, to-night being the inauguration of the thirteenth session. From the outside pharmaceutical world more will therefore naturally be expected from it, and we can, if we try, gratify those expectations. I speak advisedly: I say "*we can*;" it remains for you to say "*we will.*"

In this address it is not necessary for me to recapitulate the account of the formation of the Association, its gradual, yet continued progress up to the present, a progress, notwithstanding the opposing forces, the adverse criticisms, and the various vicissitudes it encountered in its infancy; it has been like the Herculean dragon, when one head has been cut off, seven others have appeared to substitute its place.

"Its cradle was but lowliness,
Its childhood little higher;
In youth it took a nobler strand,
Success did it inspire."

The history of the Association has been given by past Presidents, and now is on permanent record in the printed 'Proceedings' of the Association.

Last session was the best recorded, considerably excelling all previous years. The numerical strength of patrons and members was increased. The papers read at the ordinary meetings, most of which appear in weekly pharmaceutical literature, were useful, interesting and original. These papers are scanned with interest, not only by chemists' assistants in the metropolis and the provinces, but by proprietors, and even by professional scientists outside the pale of strict pharmacy.

The following is extracted from a letter written by a gentleman of high standing in the scientific world: "Your Association is a nursery for genius, and the papers emanating therefrom are worthy of more generally recognized institutions. The course you are pursuing will win the admiration of all interested in scientific work."

Another letter says: "The papers of your Association are familiar literature to me." Still another: "I read your papers with interest, and look upon your Association as a cradle for thought, and what is there shown in bud of infancy, should develope into maturity in the parent society of pharmacy, meeting in Bloomsbury Square." (Perhaps I should mention the writer of the latter is not a pharmacist.) Such are some of the few opinions expressed concerning us. Without being egotistical we may pride ourselves on our position in the eyes of those outside our scope, remembering what Cicero says:—

"It is not only arrogant, but it is profligate for a man to disregard the world's opinion of himself."

In thus speaking of the position this Association holds, I must here emphasize some of the work accomplished by it.

We are not mere nonentities in the arena of pharmacy; we are not merely collectors of other peoples ideas, though even that, when thoroughly done, and formulated, is a good work, and achieves useful results. No, our members have gone further into the field of labour than this; they have boldly entered the sacred precincts of research work. Which of you has read the prize essay, without perceiving the vast amount of original work therein contained, calling forth the compliment and comment of one of the leading

analysts of the day. Again, in another paper by our members, needing a lot of real persistent labour, was shown the shape of an accurate, well-defined crystal of pure aconitine; and also was pointed out, I think for the first time, the botanical portion of the aconite root where the alkaloid seems to be stored.

I need not enumerate other original work of our members, these instances serving as types to support me in my previous statement that our members enter the field of original work. Goldsmith says: "The little mind who loves itself, will write and think with the vulgar; but the great mind will be bravely eccentric, and scorn the beaten road, from universal benevolence."

It was my privilege, at the last annual dinner of this Association, to propose the toast of the Pharmaceutical Society. The main argument of my speech was, that that Society had, throughout, accomplished the objects of its formation, and hence merited support of pharmacists generally. Since then I have been much twitted and ridiculed by members of our craft, for having taken such a position on the side of the Society. I am happy to say that such critics, who lift their heads so high as to look with disdain upon the work of the Pharmaceutical Society (and we must remember that empty things are most easily lifted), are not members of our Association, and few of them even of our fraternity "Assistants."

In now making the bold declaration, that—*This Association has fulfilled the intention of its founders, as expressed in rule one, which reads, "The objects of this Association shall be the promotion of intercourse among Chemists' Assistants, and the discussion of subjects tending to the welfare of all interested in pharmacy,"* I have no fear of contradiction or ridicule from those within or without our ranks. This Association certainly has no apology to make for its existence; the requisition for it is patent in the fact of its hitherto unbroken progress, and its present popularity, which must of themselves emphatically prove it a *sine quâ non*, founded for usefulness, even if not for ornament. It needs no prophet to foretell that so long as the same spirit animates the members which has been manifest in the past, so long will it continue a success, and be recognized as a useful institution.

Your President last year told us why chemists' assistants did not join our ranks. I ask, *In the very objects of the existence of the Association are there no inducements for them?* Let us consider, and if we find our foundation is imperfect, let us set about to rectify it; if not, then being on the side of right, we are not unreasonable in expecting support.

First Object.—"Promotion of intercourse among Chemists' Assistants."

A lofty idea is this, a noble aspiration on the part of the founders.

Are we, unlike the general tendency of the human race, anxious to plod along life's pathway alone, freed from the trammels of companionship? Surely not. Cicero says:—

"Friendship is the only thing in the world concerning the usefulness of which all mankind are agreed." Do we look upon chemists' assistants, barring ourselves, as too ignoble to have companions? "Certainly not!" you say.

Perhaps some are desirous that their circle of friends should be limited to their own immediate vicinity. If so, I would like to remind such of the old lady who had lived all her days in a valley, never having left it upon any occasion, and who, when taken to the top of one of the hills, and shown the vast expanse around, declared with surprise, "I did not think the world was so large."

Our Association provides a more extended world of company than a single neighbourhood, from which even these individuals may find a greater choice of friends, suited to their own congeniality or idiosyncrasy: "To be influenced by a passion for the same pursuits and to have similar dislikes is the rational groundwork of lasting friendship."

Mr. Benger in his Presidential Address last year before the British Pharmaceutical Conference, seemed to imply that the foundation of that institution was the commencement of good fellowship amongst pharmacists. I may say that this Association, having a similar object in view, does indeed tend to promote good fellowship amongst its members, and many of us have made lasting friendships through our connection with it, a friendship which we have not found to be "full of dregs," as Shakespeare once said it is. Although the Association has successfully performed this part of the programme, there still remains scope for a further development of it; success does not imply perfection, nor does perfection mean completeness.

Your Ex-President, in his valedictory address last May, called attention to a suggestion that had been made: *The formation of a Chemists' Assistants' Club.* This would tend to increase the sphere of usefulness of the Association. The project I cordially agree with, but it remains with you, gentlemen, to express your ideas, *pro* or *con* upon the subject, and I can say that your Council would not be long in taking the initiative of founding a club, should they be made aware that such an undertaking on their part was your sincere wish. Their aim is to procure the greatest benefit to the greatest number. Undoubtedly such an institution would be an acquisition to the inducements held out by the Association for additions to its ranks. The isolated feeling of some young men around us is caused by having no definite place to spend a few leisure moments. Why should there not be a happy and an innocent rendezvous for such? A home away from home. I leave this for conversation and discussion among yourselves. If the time is ripe the Council is ready, and will adopt the words of Addison:—"It is not in mortals to command success, but we will do more, Sempronius; we will deserve it."

Second Object.—Discussion of Subjects interesting to those engaged in Pharmacy.

This admits of very extensive application; it is wide in its scope. Has the Association in the past failed in accomplishing it? All of us are interested, not merely in pharmacy proper alone, but in all the sciences and arts that environ it, and especially in those branches which are embraced by the trade or calling we follow; indeed, in all things appertaining to its general welfare. Pharmacy is our main object, and demands our first attention; but in its pure and simple aspect, its requirement is so limited that its practice would retain but few of those who now gain a livelihood under its title, though combined with other branches of work. To narrow the scope of a business is to lessen the number of those who can subsist upon its earnings. With this fact in view, our subjects for discussion in the past have extended beyond what is included in the definition of pharmacy; and yet have been interesting to those thus engaged. We have always borne in mind that we are chemists and druggists as well as pharmacists, traders as well as professionals.

From our ranks have gone men who have made, or will make, a name and position in the pharmaceutical world. It would be interesting to know how many of our present members will owe their progress to the meetings and the proceedings of this Association, affording as it does a medium for conveying individual ideas, the results of research, or careful study, to others engaged as pharmacists.

The youngest of us may here air our ideas, with the full assurance we shall be patiently heard; whereas the surroundings of nobler walls, and the presence of more astute individuals would completely hush our voice, by bringing our hearts into our throats when

commencing to speak; and thus the bud of promising success would be nipped rather than tended to and watered. Why is it

> "Full many a flower is born to blush unseen,
> And waste its sweetness on the desert air?"

The answer is, "Because its surroundings are unsuitable, or it is not in the position where it might be appreciated."

In the strictest sense of the term our Association is an *educating* body, having for its aim *the drawing out* of the ideas of its members, which, if new, it helps to formulate and exhibit for the world's inspection.

The science of chemistry is so closely allied to pharmacy that anything in connection with the one must also to a certain extent interest the other; at any rate, a new discovery in the one must make itself manifest in the other. Extensive as is the science of chemistry in its application and study, yet we find that some of the chief work connected with it, and some of the greatest discoveries, have been in relation to its fundamental laws and truths, which we may call its elementary portion, and at first sight declare it but simplicity. Let us not be too rash, but consider thoughtfully, since we have such men as Sir Henry Roscoe studying *Dalton's Atomic Theory*, and considering it not too simple and mean a subject to bring before the British Association; Professor Mendeleef working out the *Periodic Law*, Professor Crookes reading papers upon *Meta Elements*, *etc.*

In the face of this it appears that the simplest laws, and what we now call facts, require verifying and studying. What a field then lies before us. We assistants may not all attain to something lofty in our undertakings, but to use a popular phrase, "If we aim at the moon we shall hit something higher than a gooseberry bush." We can find subject matter for close study, thought and investigation, as these examples plainly illustrate.

Why need we despair because so many things are already discovered? In the mechanical world, some of the most useful and profitable inventions are amongst the most simple, the pen and the pin, for instance. In science it is the same.

We as young men seem not alive enough to the value of scientific research and persistent study in one direction, with a fixed aim in view; our business, certainly from its trading aspect, its long confinement, and its tedious nature, prevents and almost debars us entering upon such work, with anything like the requisite ardour to ensure success. Now that education in the various branches of the arts and sciences is so easily acquired by the mechanic, or others who have the desire for it, and the evening is to spare for attending classes where knowledge is imparted by the best of teachers at scarcely any cost, it needs but little thought on our part to decide upon the necessity of keeping abreast of the times, through careful reading and exchange of thoughts on current topics of scientific interest to which chemistry is closely related. Our Association affords means for the latter, thus inspiring the former.

Why should we not as pharmacists and supporters of the Pharmaceutical Society hope to see the Bloomsbury Square laboratories thrown open in the evenings for use of those anxious to practically investigate subjects interesting to pharmacy generally?

Someone will say: "But pharmacy is more closely allied to medicine than to chemistry." Admitted this fact; and we all know how much the medical world leaves the study of pharmacy to us; and the very limited knowledge of it required by their colleges or examinations evidence this. I am speaking of the *study* now rather than the *practice*, although I am pleased to notice that slowly even the practice is being abandoned by the doctor and left into the hands of those more qualified, from their study of its application, to perform it.

From our position as combined pharmacists and chemists, we are able to bring to the notice of the medical world many new and improved preparations, they in their turn reporting to us as to the physiological and therapeutical value possessed by such preparations. Also, by informing us of their requirements, we shall find that pharmacy will step in to supply their wants. The very able lecture on "*Relation between Chemical Structure and Physiological Action*," by Dr. Lauder Brunton, which we have doubtless all read in the pages of the *Pharmaceutical Journal* with keen interest, suggests to the pharmacist many practical ideas which, with the aid of chemistry, he may be enabled to successfully carry out.

No branch of science is yet perfect; pharmacy is far from complete. We may each find something to do in our own sphere to further develop it. Assertions need proving, discoveries need working upon, suggestions need trial, scientific recommendation needs practical application; and all of these are greatly benefited by criticism, and a declaration of opinion by those who have actually investigated them. That which may appear scientifically easy and simple, when put to a crucial test, often proves useless and an utter failure; and what may work successfully in model and theory, fails commercially. Certain ideas in connection with trade or science are considered good until better are discovered, when the old must gradually give way and ultimately succumb. As in everything else, the natural law is prevalent, "*survival of the fittest.*"

The pharmacy of the ancient apothecary was considered good, and held its own until better was introduced, and now we ridicule what was then esteemed. Have we arrived at the zenith of perfection? Is it not probable that our ideas will soon become antiquated, and that our preparations and methods in pharmacy will have to give way for better? Yes! doubtless they will.

"All those things that are now held to be of the greatest antiquity were at one time new; what we today hold up by example will rank hereafter as precedent."

It is necessary, if we would keep up with the times (and the present age moves swiftly), that we should be fully cognizant of the latest discoveries and their best forms. Here is where the value of our Association is manifested, affording as it does an opportunity for mutual help in this direction. This is the case, especially on those evenings devoted to the reading of short papers.

We must ever bear in mind that we are not to keep all our work to ourselves. If the result is useful, let us share it; neither are we to fall into another delusion; that it is not necessary for us to trouble ourselves, as someone else will do the work, and we shall hear the result, and thus reap equal benefit without entailment of labour on our part.

The ground for all work and study should now be a scientific one, if we hope to attain success. This was the suggestion of the Ex-President of the Society of Chemical Industry, in a paper read by him at the Inaugural meeting of that Society in 1881. His remark was:—"Science tells us how far we are from attaining our industrial aims with anything approaching the theoretical expenditure of force. Science also tells us in what directions we may look forward to arriving at improvements. I might say that we are on the eve of creating a science of invention, that is, of developing scientific methods for solving industrial problems." This year he showed what discoveries he had made, working upon such a scientific basis.

The work of some is lost, unless they have a means of bringing it into prominent notice.

It may be a satisfaction to them to know, as Horace

says: "He has lived not ill, who has lived and died unnoticed by the world." I think it would be a greater satisfaction for them to know they had lived for usefulness, and were noticed by the world.

Our Association affords a means of propagating the results of its members work. Knowledge possessed is power, and though imparted to others it does not diminish the source—

"To give from the pocket means less for ourselves,
To give from the mind the source remains full."

I have spoken thus far of the way in which the Association fulfils the intentions of its founders; I have also referred to advantages accruing to our members. Whilst I consider we ought to be a mutual improvement society, yet I think we should always justify our existence by endeavouring to make our work so useful and practical that its benefit will be felt by the outside pharmaceutical world. This we have done; our papers and discussions being thought worthy of publication is an evidence of this; and though we cannot do the work being done by the Pharmaceutical Conference, that not being within our scope, or even our ambition, yet it is satisfactory to note that abstracts from papers read before this Association are deemed useful enough for insertion in the Year-Book of Pharmacy.

Leaving now these few remarks, referring to the general work of the Association past and present, I must briefly refer to the—

Prospects of Pharmacy generally.—The past year has been a barren one, so far as pharmaceutical legislation is concerned, topics of far more general interest having been discussed by, and engrossed the attention of our imperial legislators; hence the small part of the community represented by pharmacists have again to wait for a convenient season.

The Pharmaceutical Society in the Curriculum Bill they this session recommended to Parliament were not ambitious in their requests. Everything that would tend to be restrictive to the British public in general was carefully left out, and the Bill only practically contained a wish that the power might be granted us to improve our own ranks, which would be an advantage to the general community, without putting upon them any burden or restraint. As is usual, all good measures meet with opposition, and this Bill did not prove an exception. Early in the session its supporters viewed it as doomed. I contend it was doomed, not so much from opposition as from the apathy towards it shown by those it was intended to benefit.

Notwithstanding objections to it have been raised by some opposers those objections are very shallow, being directed not against the objects of the Bill, but against it because it does not contain enough, is not embracing enough in its requests, and not wide enough in application. Any objection, however hollow it may be, if environed with numerous words and empty epithets, may appear hard to overcome, but as in nature hard materials are usually brittle, so should we find in these instances we have but to pull them about and they become shattered. I maintain there is much more to be said in favour of the Curriculum Bill than against it, and because it is not extensive are we to reject it? Why not get the thin end of the wedge in first?

Examination versus Curriculum may form a topic for discussion; but it is the almost unanimous decision of educationists that examination is not altogether an evidence of knowledge, but more frequently of tact and quickness of expressing mental ideas, and especially is this the case in *vivâ voce* examinations, such as pharmaceutical students have to undergo, and which to my mind is *the worst possible way of carrying out a bad principle.*

A strong protest was raised against the entire system of examination in November last. The ex-president of the Chemical Society in his address last March used the following words: "A most satisfactory feature is the adhesion to the protest of men who formerly were in favour of competitive examination as the test for entrance into civil or military service of the State."

This evil would be considerably overcome in regard to pharmaceutical qualification by a well instituted and regulated curriculum. What is required is actual systematic study, and the application of that study practically. The curriculum need not necessarily be so long as to be beyond the means of the student, nor is it absolutely necessary that the qualifying examination should be made more crucial, but if the course of study requisite for passing the examination, as at present conducted, extended over two or three years, instead of the same number of months, the ideas and truths gained and constantly applied or recalled would be more impressed upon the mind, and of more lasting benefit than at present is the case. Those who cram specially for examination cannot possibly equal those who study for the sake of knowledge, and undergo examination as a test of their progress. The present system, instead of teaching "knowledge is power," teaches that power is wrapped up for pharmaceutical students in the certificate obtained from the examiners.

Internal Reforms and Prospects.—If we cannot get a measure of reform from without our ranks, we must endeavour to get it from within. "Those only deserve help who try to help themselves."

The keen competition of the present day has rendered it imperative that many of our employers should meet it in reduced prices, and in some instances by extending the scope of the trading portion of their business. Nor are they to be blamed. It is necessary for the existence of ourselves, that not merely a legal educational qualification should be possessed, whatever that may imply, but also a business qualification, which will best advise a man as to the tactics he must pursue in his own special trade, adapted to his surrounding district. "The essence of knowledge is, having it, to apply it."

Can we hope for a better state of things in regard to prices and profits? I certainly think not, so we must make up our minds to submit to the inevitable. Competition is not on the wane, prices are not on the increase; neither are the public becoming more "respecters of persons," but rather their search is for the *best* article at the *lowest* price. Notwithstanding this, by a judicious combination of our educational acquirements and business tact, we may hope to be amongst the fittest who survive.

To achieve success, and to benefit our own fraternity we must, as stated by Mr. Groves so long ago as 1874, in his presidential address to the British Pharmaceutical Conference, "be prepared both to do and suffer in the cause. If trading instincts are allowed to smother professional feeling and practice, traders we shall and must remain; if otherwise pharmacy will eventually in this country attain the status it has so long enjoyed on the continent, and render services equally beneficial to the community."

Though fifteen years have elapsed since this was uttered, we as pharmacists still remain in much the same condition, and I think we may say the prophecy of Mr. Groves is correct. In many respects we are worse off than then, in few perhaps we have improved. Probably one improvement in our ranks may have commenced, since the suggestion of Mr. Greenish has been adopted by the British Pharmaceutical Conference.

We now are having published, through their instrumentality, reliable formulæ of what previously were *nostrums*, although someone may say, "Why should not each individual pharmacist imitate these preparations when they are required by the exigencies of his business?"

Surely it is better that when a preparation of definite name (I will not say composition, that frequently being unknown to the medical man) has gained some repute, a formula should be published for the benefit, not only of the pharmacist, but of the physician. Thus accuracy will be insured by a preparation of identical composition being supplied throughout British pharmacy.

Though we may deprecate the unlimited extension of such preparations, yet, doubtless, the more complicated pharmacy becomes the brighter is the prospect before us, for though it will inflict more labour upon us, it will have the effect of deciding the medical world to abandon pharmacy to those who are, as I have previously said, qualified from experience to carry it on.

I have touched upon a few only of the questions that will arise in connection with pharmaceutical interests. Perhaps you will say in some I have been moralizing, in others too severe or not practical. My desire is to help to create unity in working for what is already unity in wish, "benefit to ourselves, without prejudice to others."

Council Notices.—I must now, gentlemen, briefly call your attention to the Council notices and sessional arrangements.

For several years past the Council have, through the generosity of Messrs. Burroughs, Wellcome and Co., been enabled to offer a prize for the best essay on pharmaceutical improvements. This year they have the pleasure to announce that those gentlemen have further extended their liberality, and there will now be offered two prizes value £5 each, and with each of these prizes the Association's silver medal.

The one competition is for the *Research Prize* and Medal, awarded to the best *Original Pharmaceutical Investigation*; and the other for the *Essay Prize* and Medal, awarded for the best essay on *Recent Advances in Pharmacy*. The time for receiving competitions has been extended to March 31, in order to allow of more members competing. These distinct prizes now afford an opportunity to all our members to enter the competition, as those who have not conveniences necessary for carrying on original research work will be able to enter for the essay. Every inducement is thus offered to members; do not allow fear of failure to debar you entering, for the amount of knowledge gained in preparing a paper will amply repay for all the time and energy expended. "Knowledge is its own reward."

The 'Proceedings' of last session are ready for distribution, and will vie with former years in usefulness, and although not so bulky, yet an equal amount of matter is therein embodied, the type having been made smaller. Every member who was in connection with the Association last year can have a copy free on personal application, additional copies can be obtained at half the published price, at which price also members joining this session can be supplied. It is hoped that all will be disposed of, as the book must necessarily become a work of reference for the possessor.

The programme for the first half of this session contains some valuable subjects, and from the names of some of the gentlemen who have promised to read papers, I think you may safely look forward to a scientific treat as well as useful information. Much as we appreciate the presence of these gentlemen at our meetings, we are more desirous that our members should support them, and that they should join heartily in the discussion, and be stimulated themselves to prepare us something for the next half session. If they are too modest to monopolise a whole evening, then anything useful or interesting can be given on the night set apart for short papers, thus rendering mutual the working of the session.

Gentlemen,—In conclusion I must remind you that the success of the Association rests, as it ever has done, entirely with yourselves. I wish you individually to feel there is a duty devolving upon you to help on the progress and advance the interests of the Association for the benefit of those who may subsequently join its ranks. You can all help by your presence at the meetings and by joining in the discussions. With such assistance which I confidently look forward to, why should not this session be a progressive one?

It is by unity in our aims, determined and persistent perseverance in our undertakings, and an increased interest in our work that success is to be achieved.

"Nothing succeeds like success," and we have this stimulus for the coming year. Let us take the advice of Sheridan, who said, "The surest way not to fail is to determine to succeed."

At the conclusion of the address,

Mr. Joseph Ince, in proposing a hearty vote of thanks to the President, called attention to the embarrassment incidental to the occupation of a presidential chair in selecting a topic for an introductory address, and illustrated his remarks by a recent example. He referred to the objects for which the Association was instituted, and emphasized the fact that whilst the more purely social character of the Association had been borne in mind, its literary and scientific progress had extended far beyond the pale of the members, and had been such as to merit the commendation of many eminent men of science. He was unable to fall in with the suggestion that evening lectures and laboratory instruction should be given at Bloomsbury Square, for the professors and teachers had already as much work as they could get through, and even professors were but mortal! He compared at some length the educational establishments of various continental countries with those of our own, and stated that for thoroughness and industry England stood out conspicuously, and in conclusion stated that so far as his experience went no Association kindred to the one he was addressing had ever been reared in the ranks of the continental pharmacist.

Mr. W. K. Hopkin seconded the proposal, and bore witness to the able manner in which the President had detailed the aims of the Association and to the good work that its members had accomplished in the past.

Mr. E. J. Millard, as a member of the Association, supported the remarks of the mover and seconder of the vote of thanks. Alluding to the fact that the Association was commencing its thirteenth session, he intimated that as time went on so did their responsibilities increase, and individual effort was needed to maintain a healthy and vigorous existence. The facilities afforded to the members for acquiring the very essential art of speaking in public could not be overestimated. He begged them to give the President their support during the ensuing session, and concluded by complimenting him upon his comprehensive and intellectually interesting address.

Mr. Ellwood, in returning thanks, said that in an Association of this kind the work fell not only to the lot of the President, each individual member had some share in it. In an address of this nature the President expresses his own ideas, and those ideas might at times be open to criticism. He thought the near future would see the President adopting the principle that was followed by the chief officer of various societies nowadays, which was to take a subject for discussion entirely outside the section of which he might be President; he, however, had not dared to do so upon this occasion, fearing that he might incur still greater criticism. He thanked the patrons and members who were present for honouring him by their attendance and for the cordial manner in which they had received his remarks.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.

Wednesday, September 11.

(*Continued from page* 300.)

The next paper read was a—

Note on a Scale of Small Residues.

BY B. S. PROCTOR, F.I.C.

In washing precipitates or exhausting drugs by percolation it often becomes important to judge the amount of solid matter which the solvent is extracting. It rarely happens that the washing can be carried so far that a drop of the liquor evaporated on a clean slip of glass leaves no palpable amount of fixed residue, and, indeed, distilled water itself is rarely free from this evidence of impurity. In washing a precipitate of morphia the process may be continued till a drop of the filtrate leaves a residue considerably less than that left by an equal quantity of a saturated solution of morphia. If the washing is being conducted with pure water a point is reached at which the error involved by the solubility of the morphia is as great as the error resulting from the impurities which up to that time remain in the precipitate. If the washing be conducted with a saturated solution of pure morphia in pure water the washing may be continued to any desirable extent, and the extent which is desirable may be judged by evaporating side by side on a slip of glass a drop of the washings and a drop of the saturated solution of morphia; if the residue of the former is not appreciably greater than that of the latter, the washing may be considered complete.

In many operations where we have not this natural standard of comparison it is convenient to be able to judge approximately whether a drop of filtrate or percolate contains $\frac{1}{1000}$, $\frac{1}{10000}$, or $\frac{1}{100000}$ of a grain of fixed matter. And with the view of aiding this judgment I have constructed a scale of residues in which the evaporated drops contained $\frac{1}{1000}$th to $\frac{1}{1000000}$th of a grain of several fairly typical forms of soluble matter. The materials I have selected are calcium sulphate, potassium nitrate, gum acacia and gum tragacanth. These afford generally useful standards for comparison, but any operator having frequent work in any particular line would naturally reap most advantage from a scale prepared with the material most frequently requiring his judgment in this way.

In illustration, I have prepared plates of these residues, and have added a fifth series showing the same weights of suspended alumina.

In all cases I used distilled water for the first two liquors and rectified spirit for the last two, the process being to adopt a dropping tube which delivered minims of water, and which was found to deliver half minims of spirit. A grain of the soluble matter was dissolved in 1000 minims of water, and a drop of this liquor evaporated on the glass plate formed the first mark on the scale; then 10 minims of this liquor diluted with 90 of water, and a drop of this second dilution yielded the second mark on the scale. Then 10 minims of the second dilution made up to 50 minims with rectified spirit. A drop of this third dilution (equalling $\frac{1}{2}$ a minim) gives the third mark, and 10 minims of the third dilution made up to 100 minims with spirit makes the fourth dilution, a drop of which leaves $\frac{1}{1000000}$th part of a grain as the fourth and last mark in the scale.

The necessity for using spirit for the third and fourth liquors arises from the difficulty of meeting with distilled water so free from fixed matter as not to add materially to the visible size of the $\frac{1}{100000}$th and $\frac{1}{1000000}$th of a grain. Rectified spirit, on the other hand, usually contains so little impurity as not to interfere with these highly minute residues.

The President, in conveying the thanks of the Conference to Mr. Proctor for this paper, said it was homœopathy and practical chemistry combined.

The following paper was read by Dr. Thresh:—

Strophanthus Plants.

BY T. CHRISTY, F.L.S., ETC.

Having my attention called in 1878 to the value of strophanthus, I obtained through a gentleman at Mozambique all the seeds that could be found, but very few germinated. I afterwards received a small quantity from the African Lakes Company and Mr. Buchanan. These seeds were at that time called "kombe," and I planted, without any selection, some of these seeds, the result being that from this handful of "kombe" seeds, *i.e.*, the green hairy seed, different kinds of plants were raised.

In the year 1886 Mr. Buchanan sent home some roots of strophanthus. One of these grew and produced a plant from which the leaves shown herewith were taken. No plant, excepting one other that I have raised from seed, has yielded so large a leaf as this; the seed producing this plant was known as "kombe," and it had no peculiarity about it. In the year 1888 some seed was brought to this country which was quite white, called by Blondel "Woolly seed from Zambesi." I have several times planted this seed, but have only obtained one plant, which has quite a small leaf. Early in 1888 the Niger Company at last being aroused to the advantage of obtaining strophanthus seeds, brought to this country seeds which I classified as *Strophanthus hispidus*, they being plentifully hispid, and of a red foxy colour; they were found to yield an excellent tincture, giving good results, equal, if not superior, to what was known as "kombe" tincture. These plants have all a large hairy leaf and promise to develope still larger foliage, very much resembling the strophanthus sent home by Buchanan.

Professor Husemann, of Gottingen, kindly made for me a comparative analysis between the "kombe," the "hispidus," and the "minor" or so-called "niger" seeds, and he reported to me as follows:—"Both seeds of *Strophanthus niger* received from you belong to the series of cardiac drugs. Both seeds in their action upon the heart are hardly to be distinguished from the African species of strophanthus commonly known as 'kombe.' I made experiments with the alcoholic extract after eliminating fatty matters with ether. The seeds first sent (the 'minor' variety) yielded 10 per cent., and the second (the 'hispidus') yielded about 12½ per cent. of extract. The latter, by reason of a larger percentage of chlorophyll, is greener than the former, which is of a dark brown colour. Of both extracts one centigram stopped the heart's action in a frog within a few minutes; no special direct action was noticeable upon the veins, showing in this respect that the two extracts above mentioned do not differ in any way from that obtained from the 'kombe,' and furthermore no narcotic action was found."

The variety of seed which Dr. Blondel named *Strophanthus minor* (B), owing to its being very small in size, is blunt at one end and has a tapering point at the other; a good name for this would have been "turtle" strophanthus.

In 1888 Dr. Blondel came to this country and worked up the sections of the plants growing in my greenhouses at Sydenham, and he visited the Natural History Museum, South Kensington, where Mr. Carruthers brought out the whole of the herbarium collection of strophanthus, flowers and foliage. He then went with me to Kew. Dr. Oliver kindly gave up considerable time to us and went through the whole series of his specimens. We then saw clearly that what we had called *Strophanthus "kombe"* was really only a variety of the "hispidus."

In 1889 a small supply of *Strophanthus glaber* seeds from the Gaboon, with some of the pods, arrived in Paris, but unfortunately it amounted to only a few pounds. This established the fact that the pod of the glabrous strophanthus of Gaboon was of large size, smooth externally and very red in appearance, thus agreeing with an unnamed specimen in my own collection. It was also proved that this glabrous strophanthus of Gaboon yielded a crystallizable alkaloid, and further that this same seed was that employed by Professors Hardy, Gallois and Polaillon, in their earliest researches, and who had found out and declared that the strophanthus yielded a "crystallizable alkaloid." Owing to the "kombe" only having reached Europe in commercial quantities during the past few years, no serious attempt could be made to isolate a crystallizable principle.

In 1889 I received a shipment of some 150 lbs. of the seed of the glabrous variety of Gaboon. I have got one plant from some thousands of the seeds planted; the leaf of this plant (now shown) is glabrous, shiny and pointed.

All the workers with strophanthus both in Paris and in Germany find that this glabrous strophanthus yields a crystalline compound with the greatest ease, and specimens were shown by me at a meeting of the Pharmaceutical Society early this year and exist in their Museum. This variety, it will be seen, has leaves somewhat similar to some of the specimens of "kombe."

At the Therapeutical Congress in Paris, in August this year, there was a bowl of strophanthus seeds shown which I thought very beautiful and bold; but upon expressing this opinion to Dr. Blondel, he picked out for me several seeds of a "turtle" shape, as before referred to, and asked me to bite them; I did so, and found they had hardly any bitterness. He said that it was very singular that this shape of seed, not only in this variety, but in others, such as the "minor," seemed to contain very little active principle. As far as the chemist is concerned, many are now working with medical men at the therapeutics of this interesting drug by mixing the strophanthus seed with other drugs, a combination of strophanthus and alstonia constricta having been found to be valuable against obesity. In the Paris Congress Dr. Dujardin-Beaumetz clearly put forward as the result of his experiments with the tincture of strophanthus that he obtained entirely a different action when he employed strophanthin, and he strongly advised medical men to keep to the tincture as giving the best results.

In conclusion I would remark that anyone looking at the seeds sent home originally as *Strophanthus "kombe"* cannot but be surprised at the different foliage of the plants raised from what appeared to be seed of one variety only, as shown in the first series exhibited.

(*To be continued.*)

Parliamentary and Law Proceedings.

The Sale of Strychnine Vermin Killers.

On Saturday, October 12, an inquest was held at Riddings, near Alfreton, respecting the death of a single woman named Platts, from the effects of poison. The following is the evidence given, that related to the obtaining of the poison by the deceased:—

Ernest Walter Greaves deposed that he lived at Golden Valley. He was 17 years of age, and was the son of William Samuel Greaves, chemist. On Thursday night last he was in his father's shop at Ironville, about half-past seven o'clock in the evening. William Joseph Smith, assistant, was also in the shop. A woman, dressed in a long ulster and straw hat, cam into the shop and asked for a threepenny packet of Battle's Vermin Killer. He asked her what her name was, and she replied, "Elizabeth Salt." She wrote the name in the poison book, and she said that her address was "Riddings." Witness asked the deceased what the vermin killer was for, and she said it was to destroy mice with.

The Coroner: Did she bring anybody to vouch for her?—No.

Did you know her previously?—No.

Do not you see in the poison book a space left for the signature of the witness?—Yes. He added that Mr. Smith, the assistant, was with him in the shop.

The Coroner (to Smith): Why did not you insist on having a witness?

Smith: As it was a local case I did not think it necessary.

The Coroner: But you did not know this woman, and the law says you should see that she is accompanied by a witness. There is no precaution if you do not fulfil the terms of the Act.

Smith: We are very particular in regard to persons from outlying districts.

The Coroner: But you are not particular. You did not comply with the Act in this case. If proper inquiries had been made this poison would not have been supplied, and this poor woman might have been alive now.

The witness, Ernest Walter Greaves, then stated that after the deceased had signed the name "Elizabeth Salt" he supplied her with the packet of vermin killer, which contained about three-quarters of a grain of strychnine. He had seen the body of the deceased, and he was sure it was the person who purchased the vermin killer.

William Joseph Smith said he lived at Ironville, and was general assistant to Messrs. A. Greaves and Son, chemists. He corrobated the evidence of the last witness as to the sale of the poison to the deceased. Before she signed the poison book the deceased seemed a little depressed.

The Coroner: You noticed that?—Yes.

Why didn't you take it on yourself to ask her to bring somebody to vouch for her?—I didn't care to do it.

Why not?—My suspicions might have been wrong.

But you would have been perfectly justified in asking for it; in fact, the law requires you to do so. With the Swanwick case in front of you, and especially as she looked so distressed, I should have thought you would have done this. You would not have done much harm, and you might have done a great deal of good.

Dr. Warters, of Greenhill Lane, stated that he was called to see the deceased on Thursday night last. She was dead when he arrived. He found that she was pregnant, and about five or six months advanced. He suspected from her appearance that she had taken some poison. The evidence which had been given was clearly demonstrative of death by strychnine poisoning.

The jury then considered their verdict, and found that the deceased committed suicide while temporarily insane by taking Battle's vermin killer.

The Coroner briefly commented on the danger of chemists selling poison in a manner contrary to law If the chemist did not know the purchaser, he was bound to insist on having a witness to the signature.—*Sheffield Daily Telegraph.*

Obituary.

Notice has been received of the death, on the 1st of October, of Mr. William Leslie, Chemist and Druggist, High Street, Nairn, N.B. Mr. Leslie held the office of Provost of Nairn for fifteen years and in addition was an Honorary Sheriff Substitute of Nairnshire.

Review.

How to Analyse Simple Salts, Solids and Solutions. By H. Belcher Thornton, F.C.S.*

To any person commencing the study of analysis without the advantage of a tutor, this little pamphlet would be of great service; it is evidently written after experience and observation of the errors a beginner is liable to fall into if not looked after, and contains useful hints and advice on such points. The method pursued, too, is adapted for cultivating habits of observation, the student being recommended to perform certain experiments and note the results, without being told what to expect; after having made his own observations, but not till then, he is advised to compare with a text-book. The experiments are arranged so as to give at first an insight into the behaviour of the various bases and acids with certain group reagents, and afterwards confirmatory and distinctive tests are given, with advice as to methods of procedure. The value of the pamphlet is a good deal marred by a want of care in its compilation, and the use of an unscientific nomenclature, which form a strange contrast to the author's advice to his readers. In a small work of this kind, and intended, too, for beginners, such oversights as the inclusion of iodides among the salts precipitated by barium chloride, and the statement that with arseniates "ammonia silver nitrate gives a yellow precipitate," should not occur. In respect to the nomenclature employed, the terms "sulphate of potash," "hydrate of ammonia," etc., although not conforming to the commonly adopted modern system, have some excuse for their employment, but there is no excuse for the employment of "iodide of *potash*" and "cyanide of *potash*." The author seems to overlook the fact that by salts of potash were understood compounds of "acids" (anhydrides) with *oxide of potassium* or *potash*, a view impossible to apply to those containing no oxygen. A glance at the British Pharmacopœia of 1867 will show the distinction there preserved between salts of potash and potassium. If these points had received a little more attention, the utility of this little compilation as a substitute for oral teaching in the early stages of analytical study would have been materially increased.

* London: H. Silverlock. 1889. 8vo. Pp. 1-45. 1*s*.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Solubility of Sulphate of Barium in Alkaline Citrates, etc.

Sir,—Since my paper to the British Pharmaceutical Conference, printed in the *Pharmaceutical Journal* of September 8, my attention has been drawn to the fact that the influence of alkaline citrates in retarding the precipitation of barium sulphate is mentioned by Fresenius. I had looked to both volumes of Fresenius (a very old copy of 'Qualitative,' and sixth edition of 'Quantitative Analysis'), under the heads of detecting and estimating both sulphates and barium compounds, and not found any information on the point, and subsequently consulted several other works with like results.

Under these circumstances I think I was justified in using the somewhat cautious words that I had not met with any statement to the effect that citrates retard the precipitation of barium sulphate. I may now, however, add that those who may be interested in the subject will find in Fresenius's quantitative analysis, under the head of "Forms and combinations in which substances are separated from each other, or in which their weight is determined," bases of the second group, "Several salts more particularly interfere with the precipitation of baryta by sulphuric acid"——"alkaline citrates possess this property in a high degree."

Storer's 'Dictionary of Solubilities' also gives a considerable list of substances increasing the solubility of barium sulphate under the head of sulphate of baryta. The statement stands thus: "Nor is it precipitated from solutions containing normal soluble citrates, except on boiling, but citric acid alone exerts no such solvent influence (Spiller, J., *Chem. Soc.*, x., 110)."

The statement with which my paper concluded, that "tartrate of ammonium has a similar retarding effect to a rather smaller degree," remains, so far as I know, a new fact, though a fact which we might naturally have anticipated in the light of the knowledge of the influence of the citrate, and a fact which it would give no susprise to find had already been stated somewhere else. B. S. Proctor.

Ferri et Ammonii Citras.

Sir,—I have perused with much pleasure Mr. Proctor's practical and suggestive paper on the above subject, together with the discussion arising therefrom. In a note on "Ammonio-citrate of Iron," read before an evening meeting of the Pharmaceutical Society on March 7, 1885, I pointed out that the residue obtained on incinerating a portion of the salt invariably consisted of, or contained, magnetic oxide of iron.

But I do not agree with Mr. Proctor in attributing its presence to any reduction of ferric oxide; my experience of that oxide being that it is very difficultly reducible at a red heat in presence of organic matter. The more probable explanation, it seems to me, is afforded by the presence of ferrous salt in the ammonio-citrate.

I have examined a number of samples of this scale preparation, and have not met with a single one which did not contain a large proportion of ferrous salt.

A good method of testing I have found to be the following. A small quantity of the scale is dissolved in water, a little dilute sulphuric acid added, and the mixture gently warmed for a minute or two. This splits up the compound, and yields a straw-coloured solution, which is easily tested for ferrous salt by means of potassium-ferridcyanide.

With regard to residues containing magnetic oxide, I cannot say whether or not it is possible to convert the latter into ferric oxide, but certainly it is unaffected by exposure in a platinum dish to a red heat for four or five hours in the open air. My own impression is that it would be difficult to move a strong base like ferrous oxide when in combination.

I may say that when estimating various samples of ammonio-citrate I made solutions containing about 100 grains in 8 ounces distilled water, and although some kept good for several months, ultimately a kind of fermentation set up, with evolution of bad smelling gases; the iron deposited as oxide or sulphide, and the solution became colourless.

Perhaps I may be allowed to remark, in conclusion, that I do not think scientific pharmacy has yet said its last word upon the subject of scaly preparations. R. Wright.

Lex.—Proof of the addition of a foreign substance to an article of food or a drug, or of the wilful abstraction of any of its constituents, is not essential to conviction for an offence under the Act. It is an offence to "sell to the prejudice of the purchaser any article of food or any drug which is not of the nature, substance and quality of the article demanded by the purchaser." You will find the Act printed *in extenso* in the Society's Calendar.

Midlands Counties Chemists' Association.—We regret that owing to some omission of the official who supplied the report of the meeting of this Association last week, Mr. Wyley's address was not received until too late for publication.

Naval Dispensers.—Inquirer.—The statement that an increase has been made in the rate of pay to dispensers in naval hospitals, which appeared recently in a contemporary, seems to have been made under a misapprehension. In the latest reprint of the regulations the opportunity was taken to rearrange the table in which the rate of pay is stated, but the effect is precisely as it was before.

Communications, Letters, etc., have been received from Messrs. Grierson, Welborn, Wyley, Maiden, Newsholme, Dyer, Septuagenarian.

BOTANY BAY OR EUCALYPTUS KINO.

BY J. H. MAIDEN, F.L.S., F.C.S., ETC.,
Curator of the Technological Museum of New South Wales, Sydney.

(*Concluded from page* 222.)

4. Classification of Eucalyptus Kinos.

Eucalyptus kinos can be very simply classified according to their behaviour with alcohol or water. In all cases the writer made the tinctures of the strength of tinct. kino, B.P. The kinos experimented upon by the writer fall into three groups, which he has called, the Ruby group, the Gummy group, and the Turbid group respectively.

a. Ruby Group :—

E. amygdalina, Labill.
E. eugenioides, Sieb.
E. hæmastoma, Sm.
E. macrorrhyncha, F. v. M.
E. pilularis, Sm.
E. piperita, Sm.
E. Sieberiana, F. v. M. (syn. *E. virgata*, Sieb.).
E. stellulata, Sieb.
E. melliodora, A. Cunn.
E. obliqua, L'Her.

In the preparation of a tincture all the above kinos tend to dissolve entirely, forming clear ruby solutions of approximately the same tint. They also form clear ruby solutions to cold water, hardly differing in appearance from the tinctures. The aqueous solution of the alcoholic extract is similar in appearance. Members of this group are not very friable, breaking down into clean angular fragments, and never forming an impalpable powder. If acetate of lead or of copper be added to a moderately strong solution of these kinos, so strongly gelatinous a precipitate will be formed that the test-tube may be inverted without any liquid spilling. This distinguishes them, in one respect, from the Turbid Group.

At present I know of no constant characteristics to aid in further sub-dividing this group. The stringy barks (*E. obliqua*, *macrorrhyncha*, etc.), may often be distinguished (as a group) by means of fibrous bark either attaching to individual fragments of kino, or loose with a parcel of it, but it must be borne in mind that many other species (*e.g.*, *piperita*) have more or less stringy bark.

b. Gummy Group :—

E. leucoxylon, F. v. M.
E. paniculata, Sm.
E. resinifera, Sm.
E. robusta, Sm.
E. saligna, Sm.
E. siderophloia, Benth.

In spirit, these kinos scarcely dissolve, leaving abundant granular residue of gum. Supernatant liquid perfectly clear. These kinos tend to be perfectly soluble in cold water, and age seems to have but little effect on them in this respect. They are like the Ruby kinos in not forming impalpable powders, being even tougher than the members of that group. They form gelatinous precipitates with some metallic acetates, like the Ruby group.

c. Turbid Group :—

E. goniocalyx, F. v. M.
E. hemiphloia, F. v. M.
E. rostrata, Schl.
E. punctata, DC.
E. odorata, Behr.
E. Gunnii, Hook.
E. Stuartiana, F. v. M.
E. veminalis, Labill.
E. terminalis, F. v. M.
Angophora lanceolata, Cav.
A. intermedia, DC.

The above yield orange-brown solutions.

E. corymbosa, Sm.

Yields solutions up to the brightest ruby.

E. microcorys, F. v. M.
E. maculata, Hook.

Yield solutions of various shades, from lemon-yellow to orange-brown.

All the members of this group yield turbid solutions to spirit, which require long standing or filtering to become clear. They behave in a similar manner to water, but become clear on boiling, indicating catechin. The aqueous solutions of the alcoholic extract are likewise turbid. They are all more or less friable, forming impalpable powders usually by pressure of the fingers. Addition of acetate of lead or copper produces only a very slight gelatinous precipitate, thus dividing them from the other two groups.

Sub-division of the Group.

E. corymbosa kino is usually so brilliant in colour, and yields such rich-coloured tinctures that it cannot well be mistaken for any other kino.

E. microcorys and *E. maculata* are often externally much alike, but they may be distinguished (1) by the facility with which the former dissolves in water, (2) by the yellow colour which the latter yields to ether.

E. maculata, *E. punctata* and *A. lanceolata* possess odours. The essential oils which cause them may be removed by ether.

5. Definition of the Terms "Botany Bay Kino" "or Australian Kino."

Not the product of *E. resinifera*.

I propose to investigate the claim of certain species to be yielders of the kino which for over one hundred years has passed under one or other of the above names. The first published allusion to this kino will be found at p. 233, *Journal of a Voyage to New South Wales*, by John White, Esq., Surgeon-General to the Settlement, London, 1790. A plant is figured (flower-buds and bark), described by Dr. (afterwards Sir) James Smith, who wrote the botanical portion of White's book, as a new species, *Eucalyptus resinifera*, and the kino is thus alluded to :—"On making incisions in the trunk of this tree, large quantities of red resinous juice are obtained, sometimes even more than 60 gallons from a single tree. When this juice is dried, it becomes a very powerfully astringent gum-resin, of a red colour, much resembling that known in the shops by the name of kino, and for all medical purposes fully as efficacious. Mr. White administered it to a great number of patients in the dysentery which prevailed much soon after the landing of the convicts, and in no single instance found it to fail. This gum resin dissolves almost entirely in spirit of wine, to which it gives a blood-red tincture. Water dissolves about one-sixth part only, and the watery solution is of a bright red. Both these solutions are powerfully astringent." What particular tree is indicated in the above passage will probably never be known. The sample of bark figured is smooth and scribbly, like that of *E. hæ-*

mastoma perhaps, and certainly as unlike that of the two trees named by Sir James Smith and Allan Cunningham, *E. resinifera** (*vide infra*), as it is possible for it to be. Only two trees in the Sydney district yield kino in anything like the abundance it was alleged to have been yielded by the *E. resinifera* of Smith. They are *E. corymbosa* and *Angophora intermedia*, but although I am well acquainted with these trees, and have made the matter of exudations of our native trees my special observation for over three years, the highest reliable estimate of the quantity yielded by either of them would not be more than one-third of the quantity mentioned by White. The red colour would, however, exclude the *Angophora*, while *E. corymbosa* yields a "blood-red tincture" to spirit of wine, and dissolves almost entirely in that liquid, but such a kino would be readily and almost entirely soluble in cold water. Smith's description also contains the statement: "The wood is extremely brittle, and from the large quantity of resinous gum it contains is of little use but for firewood." Not too much stress should be laid upon an expression of opinion of the value of a timber made only a few months after the settlement of this continent, but the description of the wood being full of gum-resins almost certainly applies to *E. corymbosa*, or to an *Angophora*. But the flower-buds figured are of a eucalypt (and that excludes *Angophora*), while they are as unlike those of *E. corymbosa* as possible. The bark figured is smooth, the flower-buds have something the shape of those of *E. punctata* (included by Bentham under Smith's *resinifera*), while the strongly-compressed peduncle, all taken in conjunction with the smooth bark (*E. resinifera* bark is never smooth, except occasionally on the branches), may show that Smith's figures refer to *E. punctata*. But the kino of *E. punctata* is liver-coloured or reddish-brown, and that description does not tally with that of White. All this tends to prove the truth of my original assertion, that the origin of the figures in White's book will probably never be known. As likely as not the bark and the flower-buds (no other parts being figured) were from different species.

It will be seen later on that the name *resinifera* was a singularly unfortunate one to apply to any species of eucalyptus, firstly, because they are nearly free from resin, and secondly, because scores of species yield this exudation (called "gum resin" by Smith) very freely. All kinos yielded by eucalypts, if they have been exuded sufficiently long, will be found, at a certain stage, to be only soluble in water to the extent of one-sixth, but a eucalyptus kino almost entirely soluble in spirit, and at the same time only one-sixth in water, is an impossibility.

White's description (for although penned by Smith, the substance of it must have been supplied by White) has partly been copied by many subsequent authors. A few extracts will suffice.

"*E. resinifera*, the brown gum tree of New Holland, furnishes Botany Bay kino. A single tree will yield 60 gallons." Balfour, 'Manual of Botany.' *E. robusta* is the only eucalypt ever known as "brown gum," but that species neither exudes kino freely, nor is the product readily soluble in spirit.

"*Botany Bay Kino.*—The substance called by this name is the produce of *Eucalyptus resinifera* (Myrtaceæ), and other species of eucalyptus, natives of Australia and Tasmania. It appears to be a kind of extract, and has properties similar to the official kino." (Pereira, 'Materia Medica.') The surmise as to its being an extract has already been dealt with.

"*E. resinifera*, the Ironbark tree, a native of Australia and Van Diemen's Land, and several other species, yield an astringent substance called eucalyptus, or Botany Bay kino. The kino resembles in its properties the official catechu and kino, and may be used for a similar purpose." (Bentley, 'Manual of Botany.') The Ironbark tree above alluded to is the *E. resinifera* of A. Cunn. (*E. siderophloia*, Benth.), but neither it nor the *E. resinifera* of Smith extends to Tasmania.

As has already been mentioned, there are two eucalypts called *E. resinifera*. They are:—

1. *E. resinifera*, Smith (White's 'Voyages,' p. 233; 'B. Fl.,' iii., 245; figured in Decade I. of Mueller's 'Eucalyptographia'). It is commonly called "Red or Forest Mahogany," and is the tree to which the species-name attaches by priority.

2. *E. resinifera*, A Cunn. (Syn., *E. siderophloia*, Benth.); 'B. Fl.,' iii., 220. Figured in Dec. IV. of Mueller's 'Eucalyptographia.'

"*Ironbark*" *or* "*Red Ironbark.*"—At the latter place Baron Mueller states, "The Rev. Dr. Woolls observes that the Botany Bay kino is more extensively obtained from *E. siderophloia* than from *E. resinifera* (Smith, of course), which, as the specific name implies, is generally regarded as the main or even sole source of that drug." And Dr. Woolls, in his 'Plants of New South Wales,' (1885), states, "The Botany Bay kino was procured principally from this species, and hence Allan Cunningham and other botanists were accustomed to call it *E. resinifera*."

But what are the characteristics of kino? The official kino (*Pterocarpus Marsupium*) is, according to the British Pharmacopœia of 1885, "almost entirely soluble in rectified spirit." This is an important property, and on it the tinct. kino B.P. is based. Works on materia medica, while pointing out certain unimportant points of dissimilarity between the official and eucalyptus kino, never state that the latter does not dissolve in rectified spirit, while some make the specific statement that it is soluble in that liquid. But my experiments have shown that no kino is more insoluble in spirit than that of *E. siderophloia*. I obtained four samples from widely different localities in New South Wales and Queensland, and collected at different times. They all agree in their very partial solubility in alcohol, by reason of the very high percentage of gum they contain. The *E. resinifera* of Smith is also comparatively little soluble in spirit, for a similar reason. For this reason alone, I do not hesitate to say that "Botany Bay kino" is neither the produce of *E. resinifera*, Smith, nor *E. resinifera* A. Cunn. Both these kinos would be quite useless for the preparation of a tincture, and would never be thought of a second time by any person who had made the experiment on either; it is therefore quite certain that these species have not caused pharmacists to use eucalyptus kino more or less for

* *E. punctata* (included in *E. resinifera*) has a smoothish ark, but is not scribbly.

a century, but rather, it has doubtless been the admixture of such kinos as these with such eucalyptus kinos as are freely soluble in spirit, which has helped to bring eucalyptus kino into disrepute.

I now give a list of species which satisfy the requirements of the B.P., and it is hoped that systematic endeavours will be made to place kinos which do, or should come into that list on the market. Eucalyptus kino was official in the Edinburgh Dispensatory of 1811, but the different substances supplied under the same name doubtless led to its omission.

1. All members of the Ruby group.
2. The following members of the Turbid group:

E. goniocalyx.
E. hemiphloia.
E. rostrata.
E. punctata.
E. odorata.
E. Gunnii.
E. Stuartiana.
E. viminalis.
E. terminalis.
E. corymbosa.

The remaining members of the turbid group in my list must be for the present omitted, on account of their colour; perhaps *E. punctata* would have to be rejected only on that account.

All members of the gummy group must be rejected.

Important Note.—The above list only contains those species which I have proved by experiment to be suitable. I can therefore guarantee them, and will only add others to the list as opportunities occur for testing them by other chemists or myself.

I suppose it is too much to expect that the specific name of *resinifera* shall be abandoned for any eucalypt. I know it is against botanical rules; but if the specific name *virgata* could be suppressed on account of the stature of a eucalypt, I think, on the ground of expediency, Baron Mueller may well suppress Smith's *E. resinifera*,* for this name has impeded attempts to obtain a knowledge of our kinos for a century. I have already specifically referred to two objections to the use of *E. resinifera* for Smith's species, and would now emphasize that it is a poor yielder of a poor kino. Out of nearly one hundred and fifty species of eucalyptus, most of them (perhaps all) yield it more or less, and of those which yield it most abundantly it is difficult to say which produces it the most freely, and to which the term "resinifera" would by right belong. Probably to *E. corymbosa*. But the name should be suppressed.

6. Gelatinization of Tincture of Kino.

The gelatinization of tincture of kino, by which it forms a substance like red-currant jelly, and more or less devoid of astringency, remains an unsettled question, although it has often been alluded to in journals devoted to pharmacy† during the last half century. Pereira following Thomson, and most other writers on materia medica following Pereira, state that where gelatinization takes place, "Botany Bay Kino" has been used, by which is meant, as I have already shown, any of the kinos belonging to perhaps 40 or 50 species.

I have had over seventy eucalyptus and angophora kinos in spirit (to make tinctures of B.P. strength), for periods varying from a few days to twelve months, and have drawn the following conclusions:—(1) Tinctures do not gelatinize if made from new kinos. By the word "new" I mean under one or two years old. (2) No kinos gelatinize other than the clear ruby ones. Five very old ruby kinos on which I experimented gelatinized in a month or two. (3) All kinos entirely soluble in spirit are ruby ones.

Whatever the cause of gelatinization may be, or rather, whatever the substance may be which, when formed, causes gelatinization, my experiments show that no chemist need have gelatinized tincture of kino if he chooses to avoid it. Old ruby kinos should be rejected for the purpose of tincture making. In the case of a member of the Ruby group, if the kino is not completely and readily soluble in cold water, forming a clear ruby solution, with no gelatinous ruby coloured residue of phlobaphene, it should be rejected. My tinctures were made in March, 1888, and perhaps sufficient time has not elapsed to justify one in being dogmatic on the matter, but I will engage to report these samples in another year or two.

The writer has little doubt that this gelatinous looking mass consists wholly or mainly of softened phlobaphenes. By direct experiment he has shown that insoluble phlobaphenes break down after a longer or shorter period of digestion in alcohol, and form the substance already likened to red-current jelly. The subject will bear further inquiry, but certainly he cannot detect gum, or the somewhat unsatisfactory pectin in the gelatinized mass.

* Another eucalyptus product is usually called by a false name, the essential oils being generally labelled *E. Globulus*.

† Cf. *Pharm. Journ.*, i., 399; [3], x., 232.

THE PARIS UNIVERSAL EXHIBITION.

(*Continued from page* 302.)

Denmark.—One of the most interesting exhibits in this Court illustrates the enormous advance that has been made in recent years in the biological study of the organisms that play so important a part in beer brewing and other industries. Here may be seen growths of wild and cultivated yeast, the pure yeast occurring in round spots; "bottom" yeast; the "red yeast" of Pasteur, which worked such havoc among the barrack bread in Paris some years ago; *Aspergillus Oryzæ*; various moulds and cultivations of bacteria.

Dutch Colonies.—This collection contains a number of substances more or less interesting to the pharmacist. Among those from the eastern colonies may be mentioned cultivated and wild cubebs, false cubebs, long pepper, mace, nutmegs, cinnamon, patchouli, *Cassia Fistula* pods, *Sizygium Jambolanum*, *Orthosiphon stamineus* leaves, areca nut and coca leaves. Java also sends a good collection of cinchona barks, ranging from a *C. Schuhkraft* bark, containing only 0·22 per cent. of quinine, to a Ledger bark yielding 8·92 per cent. The barks are also accompanied by a number of mounted specimens of leaves and flowers of the plants from which they are derived.

Ecuador.—In this Court were noticed ipecacuanha, sarsaparilla, condurango, cinchona bark, ivory nuts, cocoa, mustard, sugar and caoutchouc.

Although there is no collection of native materia medica exhibited in this Court there is an herbarium containing specimens of the plants used in medicine in Ecuador, with the botanical names and medicinal properties given under each. A large number of these are probably not used beyond Central America, and others may be regarded as American substitutes for European drugs. The specimens of cinchona barks included *Cinchona lancifolia*, "*estoposa fina*," "chahuarguera" (*C. officinalis*), "Pata de Gallinazo" (*C. micrantha?*), "estoposa" (*Cinchona Palton*), hard carthagena bark and large flat pieces of *C. succirubra*. The list of medicinal plants is too lengthy for insertion in this notice.

Gaboon.—The exhibit in the colonial palace includes many native drugs, some of them shown by the Catholic Mission and some by the Local Administration. Among these, besides the "physic nut" (*Curcas purgans*), there are several purgative barks, bearing the native names of "ozina-zina," "osombé," "osonguma" (very powerful), "osougon'goma," "osintjé" and "ongueka." A bark named "ogagouma" is described as yielding a decoction that acts powerfully as a sudorific, and the bark of *Haronga paniculata* is said to be astringent and antisyphilitic. Two ordeal poisons are shown, m'boundu seed, supposed to be from *Strychnos Icaja*, H. Baill, and "sassy" bark (*Erythrophlœum guineense*), which came into some prominence a year or two ago in consequence of the assertion that the active principle, "erythrophlœine," produced local anæsthesia; also "onaye" pods (*Strophanthus hispidus*). Then there are "melaguetta pepper" (*Amomum Melaguetta*), "Ethiopian pepper" (*Uvaria æthiopica*); "dika nuts" and "dika bread" (*Irvingia Barteri*); manioc root; café nègre (*Cassia occidentalis*); cocoa nibs and kola nuts and leaves; the fruit of *Chrysobalanus Icaco*, or cocoa plum, which is used for making preserves; and seeds of *Bambusa arundinacea*, used as a food by the natives. Under the name "resine d'Oucame" is shown a product from a species of *Bursera*; there is also an "incense from Cape Lopez," from *Amyris Plumieri*, and copal from *Guibourtia copallifera*, the last being exported from Cape Lopez. Among the oil and fat materials are the seeds of *Elæocarpus lanceolatus*, *Pentadesma butyracea* ("graines à stearin"), *Ricinus communis*, *Myristica gibbosa* ("muscadier à suif"), *Bassia noungou* and *Elœis Guineensis*. Some caoutchouc is shown as the product of *Carpodinus dulcis*, and there is also some black caoutchouc probably from *Landolphia Kirkii* and *L. Petersiana*, which is shown as representing the caoutchouc of the equatorial regions. Lastly, there is also some vanilla, but only a few small pods are shown. In the conservatories of the Colonial Exhibition a number of plants from the Gaboon are exhibited, including, besides several of those above named, among plants yielding vegetable fats, *Bassia noungou*, *B. Djave* and *B. Acole*, and the "ochoco" fat tree, referred to the genus *Dryobalanops*, although the species appears to be unknown. Of spices, there are the Gaboon nutmeg tree, *Monodora myristica*; of dye woods Cam wood or m'pano, *Baphia laurifolia*, Baill, and Bar wood or Ezigo (*Pterocarpus angolensis*); of indiarubber trees *Landolphia Kirkii* and *L. Petersiana*, Hook; and *Tacca involucrata*, from the roots of which an arrowroot is made.

Gold Coast.—This exhibit, which is to be found in the Colonial palace, includes jequirity seed and "false jequirity" (*Adenanthera pavonnia*); chaulmoogra seeds; copalchi bark and "copalchin"; *Morinda citrifolia* bark and a fine yellow pigment extracted from it; kola nuts (*Sterculia acuminata*) and the two false kolas (*Garcinia kola* and *Heritiera littoralis*) investigated by Heckel and Schlagdenhauffen; *Guillandia Bonducella* seeds and oil; "galam butter" and "brown gutta" from *Bassia Parkii*; a "butter" from the *Pentadesma butyracea*, a tree which yields a yellow greasy juice when cut, to which it owes its name of "butter" or "candle tree"; and *Sarracenia purpurea* "for the gout." Other articles shown are coffee, caoutchouc, and palm oil.

Hungary exhibits sunflower seed oil.

India (French).—There is nothing very striking in the collection from Pondicherry, but among the things noticed were the leaf buds of *Acacia oleracea*, esteemed a table delicacy, *Rottlera tinctoria* pods, indigo, coffee, cardamoms, *Pongamia glabra* seeds and the pale yellow variety of jequirity seeds (*Abrus precatorius*, var. *leucosperma*).

Italy contributes products from the *salines* at Salsomaggiore, in Lombardy, boracic acid and borax and a very good display of vermicelli and similar pastes. There is also a case belonging to Piazzesi, of Florence, that is literally full of orris root.

Madagascar contributes some good looking vanilla, cloves and coffee. There is also some india-rubber that promises well, labelled "caoutchouc du nord;" and probably derived from *Vahea madagascariensis*, Lamb., or *Tabernæmontana elastica*, Raoul, which are the two chief india-rubber plants of the island. Besides which some gutta percha, Madagascar beeswax, and orchella weed, consisting of *Roccella Montagnei*, a species that generally grows on trees or bushes, are exhibited. This last-mentioned plant has narrower and less rigid fronds than *R. fuciformis*, which it otherwise much resembles. In the conservatory containing Madagascar plants a new species of strophanthus, *S. Rigali*, Cornu, is exhibited, as well as the tacamahac tree, *Calophyllum Tacamahaca*. Notwithstanding the troubles France has had in Madagascar scientific men have evidently been busy, for in the upper story of this house may be seen upwards of a hundred well-executed plates of the flora of the island, and beasts, birds and insects have each about as many devoted to them.

Martinique.—The principle articles noticed in this Court were some small vanilla and tinned pine-apples, essence of lemon and concentrated lemon juice.

Mexico.—In this Court there is a large collection of native materia medica, but the labels were enclosed in the bottles, and the names could only be seen by permission of the officer in charge. The list is too long for insertion here, and will be given subsequently for reference in the form of an appendix. One feature noticeable in this Court is a collection of sponges from Yucatan, including fine specimens of the velvet grass and glove sponges.

(*To be continued.*)

The Pharmaceutical Journal.

SATURDAY, OCTOBER 26, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

ELEMENTARY SCIENCE TEACHING.

IT is too much a characteristic of the people of this country to regard science generally as relating to matters outside the range of practical life. Hence it has been usual for those engaged in the conduct of industrial operations to profess a contempt for what they styled theoretical knowledge and to pride themselves upon being practical, the meaning of that designation being often little more than equivalent to the statement that they carried on their operations in a routine manner as their fathers and grandfathers had done. To some extent the abundant resources of the country in raw material may have been one of the reasons which made such a view of the matter possible, and to mention only one instance of the influence of that circumstance, it was not very many years ago when it was thought that the production of iron was an especially British industry that had no need to fear competitors. More recently the error of such an opinion has been proved, notwithstanding the great natural facilities offered by the occurrence of iron ores and coal in close proximity, which were considered to give this country an unapproachable pre-eminence in this branch of industry. Since that time many other branches of industry have experienced the influence of foreign competition, and it has become apparent that such competition has been very largely assisted by superior scientific knowledge on the part of foreign manufacturers. Germany, especially, has furnished evidence of the advantage arising from such knowledge, and the rapid growth of the productive industries of that country may be largely attributed to the fact that its manufacturers are now reaping the fruit of nearly a century of systematic cultivation of science, especially of chemistry. A recognition of this fact has to some extent led to a perception of the necessity of scientific education for everyone engaged in manufacturing occupations, but up to the present the facilities existing for the study of such an important science as chemistry are but slender. The mistaken idea as to the incompatibility of science with practical work has now, however, been to a great extent abandoned in favour of the view that the extended knowledge gained by scientific investigation is simply an entension of the field of possible industrial practice.

Under these conditions it has become a matter of importance to provide means of scientific education, and of late years it has been usual to include science teaching in school systems. But the method in which this has been done has seldom been efficient or satisfactory, and there is great need for improvement in this direction. The subject has now been taken up by the British Association, and one of the most important steps taken was the appointment of a committee to consider and report upon the present method of teaching chemistry. The first report was presented last year at the Bath meeting, and was founded upon statements made by teachers of chemistry as to the methods adopted by them. The conclusion arrived at was that much of the teaching of elementary chemistry is far from satisfactory, and that it needs to be considerably modified if it is to effect the benefit of which it is believed to be capable. In the second report, presented by the Committee at the late meeting of the British Association in Newcastle, it is pointed out that the high educational value of instruction in physical science has never been exhibited to its full advantage in our educational institutions. But experience proves that there is no more effective and attractive method of training the logical faculties than that afforded by a properly arranged course of instruction in physical science. Apart from the actually useful knowledge imparted, it has the still greater advantage of developing the faculties of observation and judgment, of accurately ascertaining facts and of drawing correct conclusions from them. The information gained by the Committee as to the existing state of scientific teaching, and as to the desire of teachers to be advised and assisted in the adoption of proved methods, has had the effect of inducing the Committee to discuss the lines which a course of elementary instruction in chemistry should follow, and to propose a scheme for that purpose. The leading principle adopted was that elementary physical science should be taught from the first as a means of mental training, and not merely as useful knowledge. Having arrived at an agreement as to the general principles on which a scheme of elementary instruction in chemistry should depend, the Committee accepted the offer of Professor ARMSTRONG to draw up an account of such a scheme in sufficient detail to serve as a guide to those who have to provide such teaching. This scheme constitutes a considerable portion of the report presented at Newcastle, and the Committee considers that it is in general accordance with the view entertained by it as to what should constitute a course of elementary instruction in physical science. With re-

gard to the manner in which such a scheme should be carried out, particular stress is laid on the following points. In order that the plan may produce its full educational effect the instruction should commence at an early age and be extended to every child in a school. It is not desired to bring forward physical science as a substitute for any other principal subjects of study, but it is desired that it should be looked upon everywhere, like those subjects, as a necessary part of education, receiving a due share of the time given to school work.

The scheme suggested by Professor ARMSTRONG is drawn up with the idea that mere chemistry is not what is needed in schools, but that the study of certain general physical phenomena must form the introduction to it. On this principle the course is divided into six distinct stages, arranged so as to lead from one to another. Stage I. comprises lessons on familiar objects and their classification according to origin, use, etc. Stage II. Lessons in measurement and the relation of measures and of densities. Stage III. The effects of heat and the phenomena of combustion and the material changes thus produced. In this way the foundation would be laid for entering upon the more special study of material changes or chemical studies proper in Stage IV., which comprises lessons of the nature of problems, such as determining what happens when iron rusts, to demonstrate the general character and particular nature of gases, the changes taking place in combustion, the constitution of atmospheric air, the composition of chalk, etc. In Stage V. the quantitative composition of substances previously studied qualitatively should be dealt with, and thus combining proportions would be demonstrated. Stage VI., studies of the physical properties of gases, as compared with liquids and solids, so as to illustrate the molecular and atomic theories and their application. It is thought desirable that most, if not all, of the experiments in each stage should be made by the pupils; but much valuable instruction could be given if the lessons took the form of demonstrations, and if the pupils did not proceed beyond the fourth stage they would acquire an acquaintance with the everyday conditions of existence which very few possess at the present day. The foundation thus formed for more special studies and for technical training would also remove a deficiency that is too frequently experienced.

At a meeting of the Council of the British Medical Association, held on the 16th inst., it was decided to accept an invitation presented in the name of the Birmingham and Midland Counties Branch, asking that the Association should hold its next annual meeting in Birmingham, and Dr. Willoughby F. Wade was chosen as President-Elect.

* * *

The next meeting of the Chemists' Assistants' Association will be held on Thursday, the 31st inst., when a paper will be read on "Photomicrography," with practical illustrations, by Mr. M. E. Swan.

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

October 16, 17, 18, 23 *and* 24, 1889.

Present on each day—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gale, Gerrard, Greenish, Ransom, Saul, Symons, Tanner, Taylor and Thresh.

Dr. Stevenson was present on the 16th and 18th on behalf of the Privy Council.

MAJOR EXAMINATION.

16*th.*—*Six* candidates were examined. *Three* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Davies, David Sidney.....New Quay.
Flint, Charles .....Stratford-on-Avon.
Foster, Murray Toogood .....Collumpton.

17*th.*—*Six* candidates were examined. *Two* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Bygott, John William .....Huddersfield.
Jeffcoat, Joseph George .....London.
Jones, William Thomas.....Wellington, Salop.
Lakeman, Nicholas Frank.....Modbury.

23*rd.*—*Six* candidates were examined. *Two* failed. The undermentioned *four* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Sayers, William Charles.....London.
Seccombe, Charles William ...Southampton.
Stonham, Herbert Lovett .....Maidstone.
Stuart, William .....Preston.

24*th.*—*Six* candidates were examined. *Four* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Peck, Ernest Saville ....Cambridge.
Tabor, Thomas Slade ....London.

MINOR EXAMINATION.

16*th.*—*Twenty-seven* candidates were examined. *Thirteen* failed. The undermentioned *fourteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Andrew, John Herbert .....Oldham.
Arnison, William Shoolbred ...Sunderland
Bainton, Arthur .....Manchester.
Baker, William Weaver .....London.
Barclay, John .....Birmingham.
Bate, Walter Humphries .....London.
Beynon, Benjamin ....Swansea.
Blanchford, Reginald Arthur..Sutton.
Brittain, Florence ....Birmingham.
Broadbent, George Henry .....Bradford.
Bush, James Edward .....Dunmow.
Carpenter, Albert Hemsley ...London.
Carter, Benjamin Robert .....Hounslow.
Watson, David Sydney .....London.

17*th.*—*Twenty-five* candidates were examined. *Sixteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Cooling, Francis Charles .....Bath.
Cullen, Frederick Spencer ...Norwich.
Douthwaite, Hy. Lonsbrough..Pocklington.
Dowswell, Charles Wesley ...Tewkesbury.
Fechtner, Arthur Louis Wm...Hull.
French, John Edward .....Sheerness.
Galloway, Philip Henry.....London.
Geen, Charles Alfred .....Exeter.
Gelling, John Alexander .. ...Douglas.

18*th.*—*Thirty-one* candidates were examined. *Nineteen* failed. The undermentioned *twelve* passed, and were declared qualified to be registered as Chemists and Druggists:—

Corry, Edwd. Samuel Warren..Barnstaple.
Griffiths, William Robert .....Clynderwen.
Hodgetts, Nathaniel .....Birmingham.
Holmes, Charles Matthew.....Bourne.
Honiatt, Albert Thomas .....Hereford.
Hopley, John Henry .....Northwich.
Houfton, Arthur Ellis .....Chesterfield.
Kent, Thomas Oliver .....Wye.
Laycock, James ....Bradford.
Leadbeater, Sidney Herbert...London.
Lunn, Arthur .....Cambridge.
Lyne, Walter Henry .....Grantham.

23*rd.*—*Twenty-eight* candidates were examined. *Twenty-one* failed. The undermentioned *seven* passed, and were declared qualified to be registered as Chemists and Druggists :—

Mitchell, Thomas Arthur .....Truro.
Morrow, Charles .....Hornsea.
Peters, George Henry..... Wrexham.
Phillips, Joseph .....Heath Town.
Smith, Richard Silcock.....Norwich.
Taylor, James .....Eccles.
Williams, William Henry .....Bethesda.

24*th.*—*Twenty-four* candidates were examined. *Fifteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Pickering, James Skelton .....York.
Poll, George James..... .....Wells, Norfolk.
Robinson, William Albert.....Carlisle.
Severs, Charles .....Kingston-on-Thames.
Shacklock, Philip Joseph .....Littleworth.
Tiffany, John William .....Halifax.
Tingle, Joseph Grantley .....Kettering.
Wallis, William .....York.
Wrench, Frederick William ...Silverdale.

PRELIMINARY EXAMINATION.

24*th.*—Certificates by approved examining boards were received from the undermentioned in lieu of the Society's examination:—

Abraham, Edward .....Caistor.
Allenby, Henry E. .....St. Albans.
Barley, Alfred Henry.....Broadstairs.
Bellamy, George William .....Hoxton.
Budworth, James Phineas.....Derby.
Dales, Edward.....Louth.
Easton, David .....Kilmarnock.
Flower, John Scott..... .....Wakefield.
Gaziello, Charles Joseph .....London.
Heap, John Henry .....Bolton.
Morgan, Richard Bonner .....Birmingham.
Robbins, Percy John .....London.
Roberts, Walter John.....Bath.
Smart, Harold William.....Willesden Park.
Smith, Frank William .....Bayswater.
Watson, Wilfred Lewis.....Kettering.
Wharmby, Walter Frederick...Mansfield.
Whiffin, Leonard John .....Sutton.

The Report of the College of Preceptors on the Examination held on October 8 was received.

Two hundred and forty-two candidates had presented themselves for examination, of whom *one hundred and thirty* had failed.

The following *one hundred and twelve* passed, and the Registrar was authorized to place their names upon the Register of Apprentices or Students:—

Adams, John .....Uxbridge.
Andrews, Thomas Newton ...Plymouth.
Appleyard, Francis Henry ...Bradford.
Appleyard, Percy ....Keighley.
Bagnall, Percy..... ...Ashton-under-Lyne.
Bentley, Lumley Scurr .....Leeds.
Blackman, Leopold Gilbert...Oxford.
Botham, William.....Whitby.
Bridger, Benjamin Charles ...Barnstaple.
Broughton, Ernest ....Manchester.
Burdon, Edward .....Spennymoor.
Butterfield, James Foster .....Driffield.
Campbell, John Henry .....New Wortley.
Chapman, James.....Bathgate.
Clark, Adam Burgess.....Strichen.
Clarke, Thomas Cooper.....Coventry.
Clode, Ernest .....Cardiff.
Crook, Frederick Stanley .....Mirfield.
Dalkin, Thomas .....Sheffield.
Dawson, Arthur Cossons .....Cheltenham.
Douglas, Hugh.....Bournemouth.
Dudfield, Frank Floor .....London.
Duncan, Henry Richard .....Gloucester.
Dusart, George Charles.....Twickenham.
Eaton, Henry .....Lutterworth.
Eggleston, George .....Alrewas.
Ellis, John .....Glasgow.
England, Charles Frederick ...Bristol.
Fawcett, Ernest John.....Whitby.
Forbes, Charles .....Aberdeen.
Foster, Fredk. Chas. Harvey...Birmingham.
Fraser, William .....Maryburgh.
Freer, Cyril Charles .....Malton.
Gibbs, William Yeend.....Birmingham.
Glendinning, James Colman...Leeds.
Hack, Robert ..... Burton Lazars.
Hampson, Thomas .. ..Leigh.
Hardman, Harry.....Southport.
Harries, John Davies .....Milford Haven.
Hart, Samuel Henry .....Hull.
Hewitt, Charles Herbert .....Sheffield.
Hodges, William John .. ..Winchester.
Howorth, Frederick Arthur.Newcastle-under-Lyne.
Huband, George Thomas .....Birmingham.
Hutchinson, Frederick Ernest.Sileby.
Ireland, Alfred Coltman . ....Leicester.
Ireland, Alfred James.....Stroud.
James, George Christopher ...Yardley.
Joesbury, Albert Edward .....Ludlow.
Johnson, John William Baker..Nottingham.
Johnstone, James .....Carlisle.
Joiner, Samuel.....Banff.
Jones, Robert .....Bethesda.
Kennedy, Alexander Anderson..Aberdeen.
Lane, John George O.....Milford Haven.
Langden, David Maxwell .....Cheltenham.
Liddle, Thomas Martin .. ..Middlesborough.
Lloyd, John Ambrose.....Chester.
Logie, John Moffat..... ...Arbroath.
Macfarlane, Malcolm.....Aberfeldy.
McGregor, Geo. Alexander.....Ellon.
McLaren, Robert.....Edinburgh.
McLennan, Alexander .....Nairn.
Main, Alexander .....Keith.
Meats, William Edward .....Leicester.
Milne, Hamilton .....Dysart.
Mitchell, William Garden.....Ellon.
Morgan, John Edward .....Devonport.
Nicholls, Ralph .....Devonport.
Ogden, Edward .....Faversham.
Orme, John William .....Heckington.
Owen, Thomas Pritchard .....Blaenau Festiniog.
Padwick, John Graeme .....Red Hill.
Page, William John .....Newport, Mon.
Paine, Charles Standen .....Bowdon.
Palmer, Frank Elijah.....Ipswich.
Parkinson, Wilfred..... ...Preston.
Pashley, E. F. Cuthbert.....Harrogate.
Penman, Edward Wright .....Jarrow.
Ramsay, William .....Dundee.

Rattray, David Smith.....Aberdeen.
Ray, George Wheatcroft .....Clifton.
Rees, Elias .....Llanelly.
Riley, Joseph Arthur .....Seaforth.
Robinson, Albert.....Manchester.
Rogers, Alford.....Llanelly.
Rothwell, William Thomas ..Radcliffe.
Russell, Edward John .....London.
Russell, George Erskine.....Paisley.
Senter, George.....Mossat.
Skeeles, Arthur Edward .....London.
Smith, Francis Joseph .....Bradford.
Steeds, Frederick George .....Dorking.
Stevenson, Robert .....Kirkcaldy.
Sutherland, John Dunbar .....Elgin.
Swanson, Alexander James ...Edinburgh.
Thomson, William .....Glasgow.
Tregaskes, Harry .....Bude.
Waddell, John.....Glasgow.
Warlow, George Henry .....Addiscombe.
Webb, Stephen Archibald.....Bristol.
Westland, Robert .....Banchory.
Whittle, William Wilford.....Melton Mowbray.
Widgery, Ernest .....Burnham.
Wilkinson, George Henry .....Dudley.
Williams, Gregory Thomas ...Cardiff.
Williams, John ....Llanelly.
Wilson, James.....Doon of Urr.
Wilson, John Henry .....Louth.
Winton, William Colin .....Haddington.
Wright, Frederic .....Knutsford.
Young, William Paterson .....Aberdeen.

The questions set at this examination were published in the *Pharmaceutical Journal* for October 12, p. 285.

The following is a list of the centres at which the examination was held, showing the number of candidates at each centre and the result:—

	Candidates.				Candidates.		
	Examined.	Passed.	Failed.		Examined.	Passed.	Failed.
Aberdeen	18	10	8	Jersey	1	0	1
Birmingham	14	7	7	Lancaster	4	1	3
Brighton	4	0	4	Leeds	10	9	1
Bristol	10	4	6	Lincoln	3	2	1
Cambridge	4	0	4	Liverpool	8	4	4
Canterbury	1	1	0	London	33	9	24
Cardiff	6	3	3	Manchester	22	7	15
Carlisle	2	2	0	Newcastle-on-T.	4	1	3
Carmarthen	10	5	5	Northampton	2	1	1
Carnarvon	4	2	2	Norwich	2	1	1
Cheltenham	3	3	0	Nottingham	11	5	6
Darlington	6	2	4	Oxford	2	1	1
Douglas	1	0	1	Peterborough	1	0	1
Dundee	3	2	1	Sheffield	2	2	0
Edinburgh	13	7	6	Shrewsbury	3	1	2
Exeter	5	3	2	Southampton	6	3	3
Glasgow	5	4	1	Truro	4	2	2
Hull	8	2	6	York	2	2	0
Inverness	5	4	1				

Provincial Transactions.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The first meeting of the session was held on Friday, October 18, in the drawing room of the Young Men's Christian Association. There was a large attendance. Twelve new members were elected. Mr. H. Wyatt, Junr., M.P.S., and Mr. J. R. Johnson, M.P.S., were elected President and Vice-President in the place of Mr. H. B. Thornton and Mr. J. F. Fleetcroft, who have left Liverpool. Mr. B. C. Robinson and Mr. Frank Walker retain their posts as Treasurer and Secretary.

The President, in the course of his address, impressed upon the members the necessity of each doing something, however little, short communications being far better than a long paper, which occupied the whole evening, and was of no practical value to students when finished. The success of the Society depended upon each individual member, and he had no doubt but that if every one put his shoulder to the wheel the Society would be a success.

The Vice-President congratulated the Society upon its position, and hoped it would be maintained.

The remainder of the evening was taken up with pianoforte solos, songs and recitals.

The next meeting will be held on Thursday, October 31, in the Society's rooms, Colquitt Street, when a paper will be read by Mr. T. H. Wardleworth on "The Flora of the Wallasey Sand Hills."

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The third meeting of the session was held in the Association's rooms, Commercial Street, on Thursday evening, October 17, Mr. D. McD. Skinner, Vice-President, in the chair. There was a large attendance of members.

After the minutes of the previous meeting had been read and confirmed, the Chairman called upon Mr. J. B. Mason to read his paper on "Sodium and its Salts."

After a brief introduction, in which he referred to the former Association, Mr. Mason began with the metal sodium, describing how it was obtained, and from that proceeded to take up in turn nearly all the official preparations.

The paper (which was illustrated with equations and experiments) was very attentively listened to, and at the close Mr. Mason was awarded a hearty vote of thanks, after which some discussion took place, in which Messrs. Skinner, Mason, Main and Henderson joined.

The Secretary then stated that, in the unavoidable absence of Mr. James Anderson, he had much pleasure in handing over the microscope, which that gentleman had presented to the Association, and in doing so he hoped that full use would be made of it by the members and that it would prove a useful aid to them in their studies.

The Secretary was instructed to write and thank Mr. Anderson on behalf of the Association for his gift.

This was all the business, and the meeting closed.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.

Wednesday, September 11.

(*Continued from page* 319.)

The following paper was read by Dr. Thresh:—

THE CHEMISTRY OF STROPHANTHUS HISPIDUS.

BY DR. THOMAS R. FRASER.

Seeds.—In order to ascertain the general composition of the seeds, a weighed quantity, after having been carefully triturated, was dried at 100° F. and extracted by percolation, first with petroleum ether, boiling below 50° C. (100° F.), and then with anhydrous ethyl ether. After the ether had been completely removed by exposure to the air and to a moderate heat, the residue was divided into two equal portions, one of which was extracted with rectified spirit, and the other with distilled water, and in the latter solution the mucilage and albumen were estimated. The water was estimated by heating a separate quantity of ground seeds to 212° F., and this

also was used for the determination of the inorganic matter by combustion. Stated in percentages, the results were—

Analysis No. 1.

	Per cent.
Water	6·7
Petroleum ether extract (chiefly fat)	31·81
Ethyl ether extract (resin, chlorophyll, etc.)	0·845
Rectified spirit extract (20 of rectified spirit to 1 of seeds)	8·94
Water extract { Mucilage	7·35
Water extract { Albumen	1·95
Ash	3·514
	61·109
Undetermined constituents	38·891
	100·000

In many other analyses, no attempt was made to estimate the water, mucilage, albumen and inorganic matter, but the seeds were merely extracted with ethyl ether followed by rectified spirit, or by rectified spirit alone. It was early found that the fat and mucilage present in the seeds rendered water an inappropriate menstruum for removing the active principle; and for the same reason even dilute alcohol, in the form of proof spirit, could not conveniently be used, especially when extraction by percolation was attempted.

These and other analyses show that the ether extract, consisting mainly of fat with a small quantity of chlorophyll and of resin, amounts to about 34 per cent. and that the alcohol extract, containing the active principle, amounts to about 9·5 per cent. of the seeds.

Ether Extract.—The ether extract, whether obtained with ethyl or petroleum ether, consists mainly of a liquid fat or oil containing chlorophyll and other colouring matters, and when obtained with eythl ether, a small quantity also of resin. It gives a permanent translucent stain to paper. Its colour varies considerably, the lightest coloured specimens being very pale greenish-yellow, and the darkest brown with a faint tint of green, the chief intermediate shades being grass-green and pale and deep olive-green. The lighter coloured ether extracts were usually derived from the later percolates, and the dark-coloured from the earlier percolates of the same seeds. The extract is translucent and clear, but after standing for some time a nearly colourless sediment usually separates, which disappears when the extract is heated to 120° F. Ethyl alcohol, amyl alcohol, acetone, chloroform, ethyl and petroleum ether, and bisulphide of carbon dissolve it freely. It has an oleaginous odour, and when dissolved in ether and washed by shaking several times with water, it has an oleaginous taste without bitterness. The well-washed ether extract does not possess any toxic action, nor indeed any other action than that of a bland oil. Its viscosity, and in the paler specimens, its appearance and other characters, are very similar to those of olive oil. The specific gravity, determined in a pale yellow or greenish-yellow oil, was found to be 0·975, in a pale green oil 0·954, and in a dark greenish-brown oil 0·9267.

Alcohol Extract.—On evaporating, with the aid of a gentle heat, the concentrated tincture of the seeds freed from substances soluble in ether, or a watery solution of it, a sweetish mucilaginous and somewhat nutty odour is developed. The extract then assumes the appearance of a translucent brownish-yellow or yellowish-brown hard substance, having some tenacity. If it be further dried, by being placed *in vacuo* over sulphuric acid, it gradually loses its translucency and becomes opaque, lighter in colour, and brittle. The extract is intensely bitter. It is freely soluble in water and in rectified spirit, sparingly soluble in absolute ethyl alcohol and in amyl alcohol, and insoluble in chloroform and in ethyl and petroleum ether. The watery solution has usually a distinctly acid reaction. When ether or chloroform is added to a solution of the extract in ethyl or amyl alcohol, the solution immediately becomes opalescent, and an amorphous deposit is by and by formed. Occasionally, when ether is added to a very dilute solution in rectified spirit, the opalescence is succeeded by the formation at the sides and bottom of the vessel of groups of colourless glassy crystals. These crystals possess the chemical and pharmacological properties of the active principle, strophanthin.

However careful may have been the extraction with ether of the seeds or of the alcoholic extract, this extract does not consist of a crystalline substance alone. The crystals are mixed with, or imbedded in, other substances of non-crystalline structure, whose existence is rendered clear when the extract is further analysed. The further analysis also shows that the quantity of non-crystalline substances varies in different extracts, and that one important cause of this variation is the amount of spirit percolated through the seeds in the preparation of the extract.

Composition of the Alcoholic Extract.

On adding to the dried alcohol extract a small quantity of rectified spirit, the extract does not entirely dissolve, but a residue remains, which is insoluble in a moderate quantity of rectified spirit. When the clear alcohol solution thus obtained is mixed with ether, it becomes densely opalescent, but in a short time the opalescence clears away, and a translucent amorphous and intensely bitter deposit occurs. The decanted and usually clear alcohol-ether solution also yields a residue when distilled and evaporated.

The first of these products is freely soluble in water, forming a mucilaginous solution, which reduces Fehling's solution, after it has been digested for some hours with a little dilute sulphuric acid. The second product agrees with the active principle, for which I have proposed the name "strophanthin," in the chemical and pharmacological characters afterwards described. The third product is insoluble in water and in acids, soluble in rectified spirit and in dilute alkalis, and precipitated from the latter solution by acids, and it is, therefore, a resin.

The quantity of each of these products, in one out of several extracts that have been analysed, is stated below—

Analysis No. 2.

Alcohol Extract of Analysis No. 1.—Total alcohol extract, 8·94 per cent. of seeds.

	P. c. of alcohol ext.
Impure strophanthin	63·367
Mucilage	16·275
Resin	14·542
	94·184

The total extract (8·94 per cent. of seeds) was, however, the sum total of the extracts of three successive percolations of the same seeds; the first having been obtained by a percolation of 10 parts of rectified spirit to 1 part of seeds, the second by a subsequent percolation of 5 parts of rectified spirit to 1 of the same seeds, and the third by a subsequent percolation of 5 of spirit to 1 of seeds. It is interesting to note the total quantity of alcoholic extract obtained from each of these percolates, and the composition of each extract.

The first percolate of 10 : 1, therefore, yielded 7·9 per cent. of the 8·94 per cent. of total alcohol extract; and this 7·9 per cent. contained a much larger percentage of strophanthin than either of the subsequent percolates.

Analysis No. 3.

	1st percolate, 10:1. Total extract, 7·9 p. c. of seeds.	2nd percolate, 5:1. Total extract, 0·674 p. c. of seeds.	3rd percolate, 5 1. Total extract, 0·37 p. c. of seeds. P. c. of extract.
Impure strophanthin .	68·16	27·44	25·67
Mucilage. .	12·27	42·28	52·7
Resin . . .	13·79	23·36	14·18
	94·22	93·08	92·12

It appears from the above analysis, that by the process of percolation nearly all the active principle is extracted by the first small quantity of spirit, and that this percolate yields an extract consisting chiefly of active principle. Further percolates contain only small quantities of the active principle, even although they may be of decidedly bitter taste; but they contain much mucilage, resin, and other undetermined substances. It is also to be noted that the extract obtained from the first percolate of a moderate quantity of the rectified spirit differs from the extracts obtained from further percolates, not only in chemical composition, but also in physical characters. After having been dried by spontaneous evaporation and by exposure *in vacuo* over sulphuric acid, both extracts may be opaque, brittle, and only slightly coloured, although the extract from the first percolate is less coloured than those from subsequent percolates; but while the former retains for an indefinite time the appearance and physical characters it had acquired on becoming dry, the latter become much darker in colour, they lose their opacity and brittleness, and acquire a plastic amorphous character and a dark reddish-brown colour. These changes occur independently of exposure, as they have been observed with extracts protected from exposure by being placed as soon as dried in well-stoppered bottles.

The impure strophanthin, precipitated by ether from an alcoholic solution of extract, is also a much purer substance when it is derived from the first percolate than when it is derived from subsequent percolates. In the former case, it is pale, brittle, crystalline, and opaque, and it retains these characters for an indefinite period; while in the latter case it is, from the first, of a brownish-yellow colour and translucent, and if dried so as to admit of being reduced to a powder, it soon becomes an adherent homogeneous mass of dark colour.

Analyses of the separated Testa and Cotyledons and Embryos of the Seeds.

The next analyses were made in order to ascertain the quantity of each of the above ingredients present in the testa and in the combined cotyledons and embryos respectively, and especially to ascertain whether the former or the latter contains the largest quantity of active principle. When the testa was carefully separated from the rest of the seeds it was found, in 119·48 grains of seeds, that the testa weighed 52·6 grains, or 44 per cent. and the combined cotyledons and embryos, 66·88 grains, or 55·97 per cent., of the seeds.

Analysis No. 4.

52·6 grains of testa yielded—

Anhydrous ether extract (28 : 1) 9·58 grains = 18·212 per cent. of testa, or 8·016 per cent. of seeds.

Rectified spirit extract (20 : 1) 4·58 grains = 8·707 per cent. of testa, or 4·873 per cent. of seeds.

66·75 grains of *cotyledons* and *embryos* yielded—

Anhydrous ether extract (26 : 1) 31·15 grains = 46·666 per cent. of cotyledons and embryos, or 26·118 per cent. of seeds.

Rectified spirit extract (20 : 1) 4·865 grains = 7·288 per cent. of cotyledons and embryos, or 4·07 per cent. of seeds.

The testa therefore yielded a much smaller quantity of ether extract, but a somewhat larger quantity of spirit extract, than the combined cotyledons and embryos. Differences in composition between the alcoholic extract of the testa and that of the cotyledons and embryos are stated below.

Analysis No. 5.

Alcoholic extract of *testa*, 4·58 grains, yielded—

Impure strophanthin, 2·7 grains = 58·95 per cent. of extract, or 5·13 per cent. of testa.

Mucilage, 0·875 grain = 19·104 per cent. of extract, or 1·663 per cent. of testa.

Resin, 0·94 grain = 20·545 per cent. of extract, or 1·663 per cent. of testa.

Alcoholic extract of *cotyledons* and *embryos*, 4·865 grains, yielded—

Impure strophanthin, 3·765 grains = 77·4 per cent. of extract, or 5·65 per cent. of cotyledons and embryos.

Mucilage, 0·48 grain = 9·866 per cent. of extract, or 0·719 per cent. of cotyledons and embryos.

Resin, 0·44 grain = 9·044 per cent. of extract, or 0·67 per cent. of cotyledons and embryos.

The alcoholic extract of the seeds, therefore, obtains most of its colouring matter, mucilage, and resin from the testa, and most of its strophanthin and oil from the cotyledons and embryos.

Reactions of the Alcoholic Extract.

The action of a considerable number of reagents has been tested upon both the dry extract and a watery solution of it.

Dry Extract.

1. Moistened with strong sulphuric acid, it first became pale yellow, then brown, and in a few seconds emerald green. In about a minute, the green was almost completely displaced by a brownish-black, and in about an hour dark green became the predominating colour, but it passed in another hour into a greyish-green. When, after the addition of strong sulphuric acid, it was placed in a chamber heated to 105° F., and the temperature was gradually raised to 120° F., the green colour soon became much intensified, and in about an hour and a half it passed into a dirty green, and ultimately into a nondescript grey, through which numerous black particles were diffused.

2. With dilute sulphuric acid (10 per cent.), no material colour change was produced within several hours, provided the extract were originally only a slightly coloured one. When the solution was then heated to 120° F., it gradually became light green, dark green, bluish green, deep blue, violet-blue, deep violet, and ultimately violet-black and brownish-grey.

The final coloured products of 1 and 2 are insoluble in water.

3. Strong nitric acid (B.P.) produced a pale brown solution.

4. Strong hydrochloric acid (B.P.) produced a yellowish solution.

5. Acetic acid (B.P.) produced a pale brownish solution.

6. Iodic acid produced a pale brownish solution, in which, however, no blue colour was developed by starch.

7. Strong sulphuric acid and bichromate of potassium produced a greenish-brown colour.

8. No distinct effect was caused by strong sulphuric acid, rectified spirit, and neutral solution of ferric chloride, nor by sulphuric acid and bromine water.

9. Solution of potash, soda, or ammonia produced a bright yellow solution, but the yellow colour immediately disappeared on the addition of dilute sulphuric, hydrochloric, or acetic acid. When the alkaline yellow

solution was boiled for a short time, it became reddish-brown in colour.

10. Phosphomolybdic acid produced a green colour, which immediately changed to blue on the addition of an alkali.

Solution of Extract in Water (2 *per cent.*).

1. Acetate of lead produced a faintly yellow flocculent precipitate.

2. Subacetate of lead produced an abundant yellowish flocculent precipitate.

After the lead precipitates in 1 and 2 had subsided, the supernatant fluid was nearly colourless and intensely bitter.

3. Solution of ferric chloride (B.P.) caused a greenish-yellow colour, and afterward a slight precipitate.

4. Nitrate of silver produced a faint opalescence, which afterwards became a dark precipitate.

5. Mercurous nitrate produced a white cloudiness, which afterwards subsided as a slight grey sediment.

6. Cupric sulphate produced a slight haziness, which, on subsidence, left a pale green fluid.

7. Platinic chloride failed to produce any change within several hours, but on the following day a slight brownish opalescence had occurred.

8. Phosphomolybdic acid produced a very pale greenish-yellow precipitate, permanent only with a considerable quantity of reagent. When the precipitate had subsided the supernatant fluid was seen to be emerald green, and the precipitate dissolved on boiling, and reappeared in cooling.

9. Molybdate of ammonium produced a faint yellow tint, and, after several hours, a considerable yellowish-white precipitate, the supernatant fluid continuing to be yellow. The precipitate dissolved on boiling and appeared again on cooling.

10. Tannic acid produced a copious white precipitate.

11. Solution of potash, soda, ammonia, lime and baryta, and of carbonate of potash and carbonate of soda, each produced a bright orange-yellow colour. Carbonate of ammonium, carbonate of baryta, and bicarbonate of potash produced a less marked yellow. In each case, the yellow colour was immediately discharged by dilute acetic acid. The alkaline yellow fluids did not reduce Fehling's solution when boiled with it.

12. Sulphuric acid (10 per cent.), dilute hydrochloric acid (BP.), and dilute nitric acid (B.P.), and dilute phosphoric acid (B.P.) each rendered the solution paler, and slowly produced a slight flocculence, which disappeared in great part on boiling. When afterwards neutralized and tested with Fehling's solution, a well-marked reduction occurred.

13. Dilute acetic acid (B.P.) produced no obvious change, and after boiling for a few seconds, and neutralizing with sodium carbonate, only a slight reduction was obtained with Fehling's solution.

14. No obvious change was produced by picric acid, carbonate of baryta, phosphate of sodium, chloride of gold, mercuric chloride, potassio-mercuric iodide, metatungstate of sodium, tri-iodide of potassium, potassio-bismuthic iodide, nor potassio-cadmic iodide.

Absence of any Alkaloid from the Extract.

The failure, already described, of many reagents for alkaloids to produce change in the watery solution of the extract, although it is naturally acid in reaction, affords sufficient evidence of the absence from the seeds of any alkaloidal principle.

In addition to this negative evidence, ten grains of the extract were treated according to Stas's method for separating alkaloids,—ether and chloroform being used as the separating solvents; but the result was also entirely negative.

At the same time, the extract contains nitrogen in small quantities, but this is by no means remarkable when its composition is borne in recollection.

Further, when the extract is made alkaline by solution of potash and then heated, alkaline vapours, having a distinctly ammoniacal or, rather, trimethylamine odour, are evolved.

Presence of a Glucoside in the Extract.

The reduction of Fehling's reagent by solutions of the extract in dilute acids having indicated the presence of glucose in these solutions, it became of importance to determine if this glucose exists in the unchanged extract, or is produced in it by the decomposition of one or more of its constituents.

Some alcoholic extract, prepared by percolating the seeds with ethyl ether and then with rectified spirit, was dissolved in distilled water so as to constitute a 2 per cent. solution. When treated with Fehling's reagent it failed to give any evidence of reduction. A portion of the same solution of extract was then acidified with sulphuric acid, and left at the ordinary temperature. After three days, the now slightly turbid solution was filtered, and after having been neutralized with carbonate of sodium it also was tested with Fehling's solution, when it immediately produced a copious reduction.

Evidence was thus obtained in an extract originally free from glucose, of a decomposition having been caused by dilute acid, of which one of the products is glucose, and the presence of a glucoside in the extract was accordingly indicated.

The production of this decomposition in the cold by the action of dilute acids was further examined. It was found that when a 3 or 4 per cent. solution of alcoholic extract in water is acidified with sulphuric acid, so that the acid is present as a 0·3 to 2 per cent. solution, the mixture in a short time becomes turbid, an apparently amorphous deposit forms in it, and in from two to four days the solution becomes clear and less coloured, and small crystalline tufts appear at the bottom and sides of the vessel, which increase in size until a considerable crystallization has been produced. To this crystalline substance I have given the name strophanthidin. On examining the solution in which the crystals have appeared, it is now found to contain much glucose.

When a minute quantity of the extract dissolved in a drop of water is placed on a microscope slide provided with a shallow cup, and a drop of 2 per cent. sulphuric acid added before the cover glass has been applied, in one or two days a large number of small and translucent globular bodies make their appearance, and in three or four days a beautiful crystallization of strophanthidin may be detected in the solution.

A well-defined crystallization produced in such circumstances in a solution of a pharmacologically active substance, is of so rare occurrence that it may usefully be applied as a test for strophanthus extract. It would probably also be an easy matter to devise a quantitative test for all strophanthus preparations, depending on the quantity of crystalline strophanthidin produced in this reaction.

If a watery solution of the extract be acidified, and after a short time shaken with chloroform or amyl alcohol, the decanted chloroform, or amyl alcohol, yields on evaporation a crystalline substance. It is, accordingly, an easy matter to obtain a well-defined crystalline product from the extract; but it will, at the same time, be found that the original solution now contains glucose, and the crystalline substance thus obtained is not therefore strophanthin, but strophanthidin, one of the products of its decomposition.

In fact the glucoside in the extract is quickly and completely decomposed by the addition of many acids; and weak solutions of several acids may, even at the

ordinary temperature, produce this decomposition sufficiently to cause crystalline strophanthidin to appear in the solution.

The following experiment illustrates the action in the cold of the weak solution of sulphuric acid:—

A 5 per cent. solution of extract in water was acidulated with sulphuric acid so as to produce a 0·4 per cent. solution of acid. The solution very soon became slightly turbid; in two days the turbidity had greatly increased; in four days, a few small crystalline rosettes had appeared at the bottom of the solution, which was now less turbid; and in five days there was a considerable pale brownish-yellow incrustation at the bottom and sides of the vessel, consisting chiefly of round groups of lancet-shaped crystals, while the fluid was now only faintly turbid, and much less coloured. The crystals, which could not be removed from the vessel without some loss, when washed and dried, weighed 18·3 per cent. of the extract used. The filtered solution, after having been neutralized, was found, on estimation with Fehling's reagent, to contain 23·4 per cent. of glucose.

In another experiment with the same strength of solution of extract and of sulphuric acid, but in which the acidulated solution was at once boiled for half an hour, an abundant formation of large and only slightly coloured crystals occurred while the solution was being raised to the boiling point, and before the temperature of 180° F. had been attained; and, at the same time, a peculiar odour, like that of cooked raisins, was developed. The crystals became broken and more deeply coloured by the boiling; but still, when dried, they weighed 27·4 per cent. of the extract. The glucose produced amounted to 27·9 per cent.

By these and other experiments, it was shown (*a*) that the extract contains a glucoside, which is readily decomposed by weak solutions of acids so as to produce glucose, and the crystalline body, strophanthidin; (*b*) that glucose is produced in the extract by sulphuric, hydrochloric, nitric, phosphoric, acetic, and oxalic acids, both in the cold and at an elevated temperature, but by 2 per cent. hydrocyanic acid only at an elevated temperature; (*c*) that crystalline strophanthidin was produced in the cold by sulphuric, nitric, and phosphoric acids; and (*d*) that crystalline strophanthidin is produced at an elevated temperature by sulphuric, hydrochloric, nitric, phosphoric, acetic and oxalic acids.

Strophanthin.

The well-defined crystals produced during the evaporation of non-acidulated watery solutions of the extract are no doubt the active principle, strophanthin.

It is, however, extremely difficult to separate the crystals from adhering impurities by the use of any solvents; and even when that is accomplished, the great solubility of strophanthin in water and in rectified spirit, entails much loss, if separation by repeated crystallization be attempted. The crystalline product obtained when ether is added to a dilute alcoholic solution of the extract, or when ether is added to a strong solution of the alcoholic extract in water, also both represent nearly pure forms of strophanthin; but, on several times repeating each process, it was found that sometimes only did it succeed in yielding a crystalline product, while frequently it failed to do so. Nice adjustments, extremely difficult to determine, are obviously required of the proportional quantities of active principles, water, alcohol, and ether, and of active principle, water and ether, respectively, in order to ensure the separation of the active principle in the form of colourless crystals.

It was therefore found necessary to devise some other process. In the first place, at an early stage in the research, the removal of impurities and the isolation of the active principle by subacetate of lead was attempted; as it had been found that after the removal of the copious precipitate formed in solutions of the extract by subacetate of lead an intensely bitter, clear, and only slightly coloured filtrate, of great pharmacological activity was obtained. When, however, sulphuretted hydrogen was passed through this filtrate, in order to precipitate lead, the active principle was necessarily subjected to the action both of sulphuretted hydrogen and of free acetic acid; and accordingly it was decomposed, glucose appeared in the solution, and strophanthidin crystallized out in great abundance.

As the extract obtained by small quantities of rectified spirit from the seeds previously percolated with ether, appeared to consist chiefly of active principle, the removal of the inconsiderable quantity of impurity present in it was attempted by treatment with pure animal charcoal; but this process also proved unsatisfactory both in the quantity and quality of the product obtained.

After several other attempts, the following was adopted as a tolerably satisfactory, though, no doubt at the same time laborious, process for separating the active principle in a pure form.

The active principle was precipitated by a solution of tannin from a strong solution of the extract in water; the well-washed tannate was thoroughly mixed with recently precipitated, carefully washed, and moist oxide of lead, which was added in the quantity calculated to be necessary for the conversion of the tannin into tannate of lead; the mixture was digested for several days at a low temperature; and, after it had been dried, it was thoroughly exhausted with rectified spirit, and occasionally with proof spirit. If the alcoholic solution still contained any tannin, as it usually did, it was evaporated to a syrupy consistence, and again treated as above with a smaller quantity of oxide of lead. It was frequently necessary to adopt a third such treatment before every trace of tannin had been removed. The product was now dissolved in weak alcohol, and, if necessary, decanted and filtered from sediment; and through the clear and usually almost colourless solution, a gentle stream of well-washed carbonic acid was passed for two or three days, in order to remove traces of lead. The solution was then evaporated to dryness, and the residue dissolved in rectified spirit, and, after filtration, ether was added to the solution to precipitate the active principle. The precipitate was dissolved in absolute alcohol, which usually left a further slight sediment, and the clear alcoholic solution was finally dried by spontaneous evaporation, and by being placed in a partial vacuum over sulphuric acid.

By this process about 65 per cent. of the active principle, strophanthin, was usually obtained from the extract. This quantity, undoubtedly, does not represent the whole of the active principle present in the extract; but the result otherwise is satisfactory, in so far as the quality of the product is concerned.

Strophanthin thus obtained is a colourless, opaque, and brittle substance, having an appearance suggestive of a crystalline body, but exhibiting no crystals to the naked eye. Under the microscope, however, it is found to consist of minute irregular crystalline plates.

When ether is added to very dilute alcoholic solutions of it, and the faintly turbid mixture is put aside in a stoppered bottle for a few days, beautifully stellar groups of colourless and transparent crystals frequently form on the sides and at the bottom of the bottle.

Strophanthin is very freely soluble in water and in rectified spirit, losing its opacity when a very small quantity of either solvent is added to it, and becoming a viscous, clear, and faintly yellow solution on further minute additions. It is soluble in 55 parts of absolute alcohol (sp. gr. ·796), in 300 parts of acetone, and in 1000 parts of amyl alcohol (sp. gr. ·820). It is almost insoluble in chloroform (sp. gr. 1·497), in absolute

(sp. gr. ·723) and common (sp. gr. ·730) ethyl ether, in petroleum ether boiling below 120° F., and in bisulphide of carbon.* Glycerine (sp. gr. 1·26) dissolves it freely: but when small quantities are placed in strophanthus oil and in olive oil, respectively, they remain unchanged for several months, although afterwards the particles appear to dissolve very slowly.

Solutions in rectified spirit and in amyl alcohol are precipitated by the addition of chloroform, absolute or common ethyl ether, petroleum ether, and bisulphide of carbon. A solution in absolute alcohol is precipitated by ethyl and by petroleum ether, and is rendered slightly turbid by bisulphide of carbon; but neither chloroform nor acetone produces any change in the appearance of the solution. A solution in acetone is precipitated by ethyl ether, petroleum ether, chloroform and bisulphide of carbon, but not by absolute alcohol nor by amyl alcohol.

Strophanthin is intensely bitter. Its solution in water or spirit is acid in reaction. When a dilute solution in water is shaken, a persistent froth is produced.

It melts at a temperature of 343° F. Below this temperature, at about 295° F., it acquires a faintly yellow colour, which becomes yellowish-brown at the melting point. When the temperature is further raised, it evolves fumes having at first a caramel and then a disagreeable empyreumatic odour, becomes charred, and finally disappears without almost any residue.

When heated in a test-tube with soda lime, and when tested by Lassaigne's cyanogen process, it was found to contain no nitrogen.

Ultimate Analysis.—In order to determine its percentage composition, several combustions were made, of which the three following agree closely in their results:—

Analysis No. 6.

0·3 gram, yielded CO_2, 0·610 = 55·45 p.c. C.
„ „ H_2O, 0·204 = 7·55 p.c. H.

Analysis No. 7.

0·1789 gram, yielded CO_2, 0·3635 = 55·41 p.c. C.
„ „ H_2O, 0·1222 = 7·58 p.c. H.

Analysis No. 8.

0·1893 gram, yielded CO_2, 0·3849 = 55·45 p.c. C.
„ „ H_2O, 0·1288 = 7·56 p.c. H.

These percentages correspond with the formula $C_{16}H_{26}O_8$.

	Found (average of above three analyses).	Calculated for $C_{16}H_{26}O_8$. Per cent.
Carbon	55·43	55·49
Hydrogen	7·56	7·51
Oxygen (by subtraction)	37·01	37·0

$C_{16}H_{26}O_8$ may, therefore, provisionally be adopted as the formula of strophanthin, until, at any rate, more complete knowledge has been obtained of its constitution.

Reactions.—When various reagents were applied to strophanthin in the dry state, and also in 2 per cent. solution, the results were as follows:—

Dry Strophanthin.

1. When a minute quantity, in the form of powder, was moistened with a drop of strong sulphuric acid, a bright green colour was immediately produced, which in a few seconds became greenish-yellow, and then brown at the centre with green at the edges. In twenty minutes the whole was brownish green; in a few minutes afterwards it was grey, with a greenish tint; and in the course of an hour or two dirty brown, without any green.

When strophanthin moistened with strong sulphuric acid was heated to between 110° and 120° F., the green colour first produced soon became dark olive, changing to very dark brown, with green at the parts which had dried, then to violet and dark violet-blue, and finally to black with a violet tint.

2. With 10 per cent. sulphuric acid, a nearly colourless solution was produced, which remained unchanged in appearance for several hours.

When heated between 110° and 120° F. with 10 per cent. sulphuric acid, it soon became light green, grass green, dark green, deep bluish-green, deep greenish-violet, very dark violet, and in about two hours, black with a violet tint. When allowed to cool the last colour remained for more than twelve hours.

These colour changes were quite distinctly obtained with even the $\frac{1}{16000}$ of a grain of strophanthin.

3. Strong nitric acid in the cold produced a pale brown solution.

4. Dilute nitric acid (10 per cent.) merely dissolved strophanthin, without obvious change of colour.

When heated between 115° and 130° F. with 10 per cent nitric acid, a violet colour was first developed, in which blue streaks appeared; the whole then became violet for a few minutes, then yellow appeared at the margins, the violet gave place to yellowish-brown, and, finally, in about forty minutes, the whole became gamboge-yellow, and remained this colour for several hours.

5. Strong hydrochloric acid dissolved strophanthin, forming a pale yellow solution, which afterwards became brownish-yellow.

6. Dilute hydrochloric acid (10 per cent.) dissolved it, and produced a colourless solution.

When heated between 115° and 130° F., changes were very slowly produced; in about twenty minutes, a yellow colour appeared, which, however, soon passed into green, and then into blue (Turnbull's), and the last colour remained for several hours.

7. Strong sulphuric acid and bichromate of potassium, in the cold, produced successively green, orange-brown, dark brown with green at the edges, and emerald-green. When now heated to between 115° and 120°, the green slowly became bluish-violet.

8. When to a minute particle of strophanthin there was added a small drop of distilled water, and also of dilute solution of ferric chloride, and then a drop of strong sulphuric acid, a deep yellow colour appeared, which changed to pink. On mixing the whole with a glass rod the pink disappeared.

9. Solution of phosphomolybdic acid developed rather slowly a green tint, which on prolonged exposure became a pure blue of considerable intensity. If an alkali was added along with or after the phosphomolybdic acid, the blue colour was immediately developed.

10. Solution of potash, soda, and ammonia, and of other alkalies and their carbonates, produced a faint yellow colour, which disappeared on the addition of acids.

11. Negative results were obtained on the addition of iodic acid and starch, nitrate of silver, sulphate of zinc, sulphate of copper and Nessler's reagent.

Solution of Strophanthin in Water (1 or 2 per cent.).

1. Concentrated, or 10 per cent. solutions of, sulphuric, nitric, hydrochloric, phosphoric, and chromic acid, and concentrated acetic acid, each produced a slight haze even in a 1 per cent. solution of strophanthin. When the solution was afterwards neutralized and tested with Fehling's reagent the reagent was in each case reduced.

2. Sulphuric acid and bichromate of potassium also produced a slight opalescence, and the solution, on being neutralized, reduced Fehling's reagent.

* In the experiments that were made, chloroform dissolved 1 part in 10,000, and absolute and common ethyl ether, petroleum ether, and bisulphide of carbon about 1 part in 20,000.

3. Solutions of potash, soda, ammonia, lime, and baryta, of carbonate, of ammonium, and phosphate of sodium, each caused the solution of strophanthin to become of a light yellow colour; but even after prolonged contact, the yellow solutions did not reduce Fehling's reagent. The alkaline yellow fluids became deep reddish-brown when heated to 212° F., and, at the same time, they lost much of their original bitterness, and apparently also of their pharmacological activity.

4. Solution of ferric chloride produced no change until sulphuric acid had been added, when a faint opalescence occurred. When a drop of 1 per cent. strophanthin in water was placed on a white porcelain slab, and a minute drop of solution of ferric chloride, followed by a small drop of strong sulphuric acid, was added to it, a yellow colour was first produced, and then streaks or patches of pink and blue were quickly developed. In a short time, the whole assumed a dirty pale greenish-blue colour.

5. Solution of nitrate of silver very slowly produced a reddish-brown colour and a slight dark deposit.

6. Phosphomolybdic acid slowly produced a bright green colour, which gradually passed into greenish-blue.

7. Tannic acid solution threw down a copious yellowish-white precipitate, which redissolved until an excess of the acid had been added.

8. Molybdate of ammonium in sulphuric acid produced a slight opalescence, and Fehling's reagent afterwards revealed the presence of glucose in the neutralized solution.

9. Negative results were obtained by an addition of chloride of gold, platinic chloride, cobaltic chloride, acetate and subacetate of lead, mercuric chloride, mercurous nitrate, ferro- and ferri-cyanide of potassium, chloride barium, acid carbonate of potassium, iodide of potassium, tri-iodide of potassium, tribromide of potassium, potassio-mercuric iodide, metatungstate of sodium, potassio-bismuthic iodide, and potassio-cadmic iodide.

Decomposition by Acids, etc.

Glucose having been produced by the application to strophanthin of such of the above reagents as were acid in reaction, it was indicated that this substance is a glucoside. This indication has been rendered clear and unambiguous by the results of other experiments, of which the following are given by way of illustration.

To a colourless and clear 3·3 per cent. of strophanthin in distilled water, sulphuric acid was added so as to make the solution a 0·3 per cent. one of acid, and the solution was then left to itself at the ordinary temperature. On the following day, it had become slightly turbid, and two days afterwards several colourless rosettes of lancet-shaped crystals had formed at the bottom of the flask. On the fourth day, the rosettes had increased in size, and now also a general crystalline incrustation had occurred over the bottom and sides of the flask, while the solution had lost its turbidity, and had again become quite clear. The crystals increased in quantity during the next twenty-four hours, and, on the sixth day, when they were collected as carefully as possible, they weighed 33·7 per cent. of the strophanthin used. The filtered solution, after having been neutralized, was found to contain 22 per cent. of glucose.

In an experiment with the same quantity of strophanthin and of sulphuric acid in solution, as soon as the solution had been made it was placed in the water-bath and gradually heated. While the temperature rose from 150° to 165° F., a beautiful crystallization appeared in the solution, consisting of slender colourless crystals, many of them being $\frac{3}{4}$ of an inch in length, and the solution at the same time became slightly turbid. The temperature was raised to 212°, and maintained at this point for half an hour; during the boiling, an odour like cooked raisins was given off, and the solution became slightly yellow in colour. When the solution had cooled, it was found that, in addition to now partially broken, long and slender crystals, a further crystallization had formed, consisting of colourless nodules or tufts attached to the bottom of the flask. The washed and dried crystals weighed 36·2 per cent. of the strophanthin used, and there was found in the filtered solution 27·5 per cent. of glucose.

Sulphuric acid was the only acid employed to decompose strophanthin; as it seemed unnecessary for the present purpose to multiply the experiments, in view of the evidence already described regarding the action of other acids on the extract of strophanthus, there being no reason to doubt that the decomposition of strophanthin into glucose and strophanthidin will occur under the influence of those other acids which have been shown to decompose it in the extract.

It was found that large quantities of crystalline strophanthidin, and considerable quantities of glucose, were produced by the prolonged contact in the cold of strophanthin with from 0·3 to 1·5 per cent. sulphuric acid. Crystalline strophanthidin was also abundantly produced when strophanthin was boiled for a short time with 0·3 per cent. sulphuric acid; and much crystalline strophanthidin, but proportionally less glucose, when strophanthin was heated between 160° and 170° F. with 0·5 per cent. sulphuric acid. When, however, strophanthin was boiled with stronger than 0·5 per cent. sulphuric acid, although much glucose was generally produced, no crystalline strophanthidin, but only a brown amorphous substance, appeared as a result of its decomposition.

The crystals of strophanthidin produced in the cold by H_2SO_4 were usually in the form of colourless nodules or rosettes, consisting of moderately thick, lancet-shaped crystals. The finest crystals, of long and slender form, were obtained when strophanthin was heated to 160° or 170° F. with 0·3 and 0·5 per cent. sulphuric acid.

In addition to the influence of acids on strophanthin, that of ptyaline was also examined. 0·1 gram of strophanthin was dissolved in 5 c.c. of distilled water, and to the clear solution 2 c.c. of filtered saliva* was added. The now decidedly alkaline mixture was digested for an hour at a temperature ranging between 99° and 100° F. The digestion did not produce any obvious change, nor could any strophanthidin be detected in the fluid after it had cooled. When, however, it was tested with Fehling's reagent, reduction immediately occurred, and an estimation showed that rather less than one per cent. of glucose had been produced. Prolonged contact with saliva is therefore able to cause only a slight decomposition. As a large quantity of saliva of great protylytic activity had been used in this experiment, it is reasonable to infer that in the ordinary administration of strophanthus, decomposition will not be produced to any appreciable extent by admixture with the mouth secretions.

As only slight decomposition occurs when extract of strophanthus is digested for half an hour with 0·1 per cent. hydrochloric acid at a temperature ranging between 98° and 100° F., the inference also appears to be justified that when strophanthus is introduced into the stomach it will probably be absorbed into the blood before any important part of the dose has undergone decomposition.

* The saliva was obtained, with the usual precautions to exclude impurity, from an adult to whom pilocarpine had been administered. It was alkaline in reaction, and neither before nor after prolonged heating did it affect Fehling's solution. A small quantity rapidly and abundantly produced glucose in starch solution.

Still, these experiments, and indeed all the experiments in which strophanthin was shown to be decomposed by acids, render it not only of interest but probably of practical importance to determine, as I propose on some early occasion to do, the pharmacological action of strophanthidin itself.

Strophanthidin.—In the meantime, in addition to those physical and chemical characters of crystalline strophanthidin that have incidentally been mentioned, it may be added that it has an intensely bitter taste and a neutral reaction; that it is very slightly soluble in cold water, moderately soluble in cold rectified spirit, chloroform, and amyl alcohol, and pretty freely soluble in warm rectified spirit; that it does not give a glucose reaction with Fehling's solution, either before or after prolonged digestion with 2 per cent. sulphuric acid at 200° and 212° F.; and that it is extremely active as a pharmacological agent, 0·0025 and 0·00125 grain producing death in frogs weighing 350 grains and 340 grains, respectively, with symptoms closely resembling those produced by strophanthin. It can readily be obtained in colourless crystals by the spontaneous evaporation of a solution in rectified spirit.

As a solution of recrystallized strophanthidin, produced by the decomposition of strophanthin by sulphuric acid, remained unchanged when solution of chloride of barium was added to it, strophanthidin cannot be regarded as a combination of some substance present in strophanthin with the acid employed in decomposing it.

The amorphous brown substance obtained by boiling strophanthin with moderately strong acids has not been examined further than to determine that it is much less bitter than either strophanthin or strophanthidin, and that it is insoluble or nearly so in water and acids, and soluble in alkalies and rectified spirit.

Kombic Acid.—Basic and neutral acetate of lead have been enumerated among the reagents which produce precipitates in solutions of the extract in water. The precipitate obtained by the former reagent has not been examined. That produced by neutral acetate of lead, after having been carefully washed with distilled water, was decomposed by sulphuretted hydrogen, and the filtrate from lead sulphide was concentrated by evaporation at a low temperature, and then dried *in vacuo* over H_2SO_4. There was thus obtained a scaly brownish-yellow substance, representing 1·6 per cent. of the extract, of strongly acid reaction, and freely soluble in water. For this acid, the name "kombic acid" is suggested.

Comose Appendages.—On being subjected to analysis, the comose appendages of the seeds yielded a relatively small quantity of strophanthin and a large quantity of a resin-like substance. Even when one pound weight of appendages was examined, no alkaloid could be isolated by Stas's process.

Follicles, leaves, roots, etc.—Chemical examination of the pericarp of the follicles, of the leaves, branches, stem and root of strophanthus resulted in showing that each of these parts of the plant contains strophanthin, but only in small, and in some of the parts, in minute, quantity.

Specimens of the leaves of strophanthus grown by Mr. Christy at Sydenham were placed on the table.

The PRESIDENT said all would appreciate very highly the paper by Dr. Fraser, who had done an immense amount of work on strophanthus. In reference to the leaves exhibited he said the various kinds of plants produced from the strophanthus seeds of the trade were remarkable; he had lately seen them growing, and one could scarcely recognize the plants from some of the seeds as being strophanthus at all; they were so wholly dissimilar. He was very sorry that Mr. Christy was not present to make some remarks on the subject.

Mr. WELLCOME said Mr. Christy had dealt so thoroughly with the subject that hardly anything he could say in the direction of his treatise would add to the information of the members. It was very well known to all who had occasion to employ strophanthus seed that very great care was necessary in purchasing those which came to the London market to avoid false seeds. Many of them were absolutely inert, and others were either so damaged in transit or being gathered before they were ripe that they were entirely useless. The great value of Dr. Fraser's paper was obvious to them all, and they had been looking forward for a long time to the results of his work on the active principles of strophanthus.

Mr. DOTT said he had nothing to add to the chemistry of the subject which had been so well dealt with by Professor Fraser. With regard to the seeds, certainly the appearance of some of them showed that they were not genuine, but in other cases it was not so easy to determine. Some had come into his hands about which he had a little doubt, and on submitting them to Dr. Fraser he at once said they were immature, and on comparing their weight with the genuine sample he found they weighed about half what they should, which confirmed Dr. Fraser's opinion that they were immature.

The PRESIDENT asked if Dr. Fraser had any of the varieties of seeds met with in trade under cultivation?

Mr. DOTT said there were some in the Botanical Gardens in Edinburgh.

The Conference then adjourned for luncheon.

Upon resuming the first paper read was on—

NARCEINE AND ITS SALTS.

BY D. B. DOTT.

Narceine is one of the opium alkaloids which exist in larger quantity, it being present in sufficient amount to admit of its employment in medicine to a considerable extent. So far, however, it has not come into very general use, although favourably regarded by some of the German physicians. The purity of commercial narceine does not seem to have been suspected until the appearance of a paper by Laborde in the *Archives de Pharmacie* (April 5, 1887),* wherein it was stated that narceine, specially purified so as to be free from morphine and codeine, was found to be more active than any he had used before. Now, considering the great facility with which narceine may be separated from morphine and codeine, it is highly improbable that any manufacturer would send out narceine so contaminated; and even supposing such a curious result had occurred, it is difficult to comprehend how the action of the alkaloid could be weakened by the presence of morphine or codeine. The statement is probably one of the many inaccurate conclusions which have been arrived at from therapeutical experiments. Subsequently there was published a communication† from Claus and Ritzefeld, who at first imagined they had prepared a new base by the action of potassic permanganate on narceine, but soon found that the product was nothing other than pure narceine. These chemists therefore recommend that method of limited oxidation for the purification of narceine, stating that while the commercial base melts at 145°, the alkaloid so purified melts at 162°. Quite recently a paper on "chemically pure narceine" was contributed by E. Merck, who describes some interesting experiments and corrects certain misconceptions of previous writers on the subject. It is to the paper of Merck that I would specially refer.

In the first place it seems advisable to remark that Merck, like many other German chemists, ignores the work done by English and French chemists. The

* *Pharm. Journ.*, [3], xvii., 882.

† *Ber.*, xviii., 1575, and *Pharm. Journ.*, [3], xviii., 621.

whole subject of the hydrochlorides of narceine was some years ago very fully investigated by Dr. C. R. Alder Wright, who mentions* most of the facts which are referred to by Merck as if they were new discoveries. It is a matter of old observation that narceine which has been precipitated from hydrochloride by ammonia tends to retain chloride very energetically. Wright showed that this was due to the formation of basic hydrochlorides, the compound becoming with each crystallization more basic, until ultimately a salt was apparently obtained which contained a great number of narceine molecules to one molecule of hydrochloric acid. I am rather inclined to think, however, that by a sufficient number of recrystallizations chlorine-free narceine would be obtained, just as by a sufficient treatment with water, oxychloride of bismuth is converted into pure oxide. Wright's method of obtaining pure narceine from the basic hydrochloride is to convert into sulphate, which after recrystallization and precipitation yields the pure alkaloid. Merck is not very clear as to the method followed by him, but he mentions the fact that if caustic soda is used to precipitate, the narceine may be obtained free from chlorine. The same chemist seems inclined to regard these basic hydrochlorides as mixtures or compounds of the normal hydrochloride with the alkaloid. I do not think that is a tenable hypothesis, but is rather one which arises from a mistaken view of such salts. Whether it be true that all alkaloidal salts are simply molecular compounds, it is certainly true of some of them. The so-called acid hydrochlorides, for instance, are evidently of this nature, being analogous to the so-called potassium quadroxalate. That is to say, the second molecule of hydrochloric acid is not atomically combined to the alkaloid, but is simply related to it as the "water of crystallization" to the salt molecule. The basic hydrochlorides of narceine are doubtless of the same nature, so many molecules of alkaloid being feebly combined with so many molecules of acid. The view formerly referred to, that these salts are compounds of the normal salt with alkaloid, does not appear to be tenable; because when one molecule of the normal salt is decomposed by water, there is no obvious reason why all the molecules present should not be similarly decomposed. Merck thinks that the behaviour of narceine towards acids contradicts the current assumption that narceine is a very weak base. Yet surely the tendency to form basic salts is no proof of strength. Bismuth and antimony salts tend to form basic compounds, not because their oxides are strong bases, but rather the contrary. It is impossible to say whether the normal salts of narceine are acid in reaction or not, as they no doubt all suffer more or less decomposition when dissolved. When narceine is suspended in hot water, and sulphuric acid gradually added, complete solution does not take place until sufficient acid has been added to form the acid sulphate, which fact is another proof of the feeble character of the alkaloid. Indeed narceine follows the general rule, that the higher the position of a compound in a series, the less developed is its distinctive character; and if the morphine series of alkaloids were truly homologous the rule would doubtless be strictly correct. Codeine is a stronger base than morphine, but although it differs by CH_2, it is not a true homologue of morphine. It is in reality what has been called a "compound ether" of morphine, for want of a better name. The most interesting portion of Herr Merck's paper has reference to the melting-point of narceine. It is shown that the melting-point is greatly lowered by the presence of a small proportion of hydrochloric acid, from which it would appear that much of the impurity formerly spoken of was nothing but a little acid, which is pharmacologically speaking no impurity at all. It further appears that decomposition takes place at, or probably under, the observed melting point of 170°. The question arises, can a substance be said to have a melting-point, which is above its temperature of decomposition? The discrepant statements as to the melting-point of morphine, led me to try one or two experiments, but I soon found that the morphine showed signs of extensive decomposition before there was any appearance of fusion, and therefore abandoned the experiments as useless. In short, the melting-point as a means of determining purity, must be regarded as of very limited application in the case of the complex alkaloids. From all we have been able to learn, the general practical conclusion would seem to be, that no proof has been adduced to show that commercial narceine ever contains any impurity which can affect its value as an article of the materia medica.

* *Chem. Soc. Journ.*, xxvii., 109.

The PRESIDENT said this was a very difficult subject, but Mr. Dott had made it a special study for some years past, and no one connected with the Conference was better able to speak upon it. Mr. Dott's former papers had been looked upon as standard works on the various alkaloids of opium, which he had from time to time investigated.

Mr. MACLAREN also added his testimony to the value of Mr. Dott's work upon these alkaloids.

The next paper read was on—

NOTE ON LEMON JUICE.

BY T. HOWELL WILLIAMS, F.C.S.

In the British Pharmacopœia of 1867 lemon juice is described as having sp. gr. 1·039 and containing 32·5 grains of citric acid in 1 fluid ounce. In the Pharmacopœia of 1885 the sp. gr. is given as from 1·035 to 1·045 and the quantity of citric acid as from 36 to 46 grains per fluid ounce. The variability of the juice is here very properly allowed for, but as far as my experience goes the standard for citric acid is much too high. From 30 to 36 grains per ounce citric acid would more correctly represent the amount present in lemon juice as commonly obtained from the finest imported fruit during the winter months, and from 20 to 30 grains per ounce when the juice is pressed in summer.

On looking up the literature of the subject I find very conflicting statements. For example, Bentley and Redwood, in their 'Materia Medica,' give the citricity of lemon juice as 32 grains per fluid ounce, while Mr. W. W. Stoddart, in a paper which he read at the Norwich Pharmaceutical Conference in 1868, gives as the result of the examination of eight lemons from 39 to 46 grains of citric acid, and he concludes that should there be less than this the lemons must have been kept too long or gathered too late in the season. Flückiger and Hanbury, in the 'Pharmacographia,' consider 40 to 46 grains per ounce the normal quantity of citric acid, while Warington, whose experience on this subject is very extensive, states that English pressed juice contains from 11 to 13 ounces to the gallon, that is, from 30 to 35·5 grains per ounce.

Under these circumstances, being asked to contribute to the Conference, I have thought that the results of analyses performed in the laboratory of my firm upon juice obtained by us from fruit of our own importing might perhaps be acceptable. There was no idea of publishing these results until a few days ago. Lemon juice is, with us, only a bye-product, and it is only occasionally that the results of analyses have been recorded, and still less often that the yield of juice has been noted. The lemons are not pressed to the full extent of the hydraulic press, as time is considered of more value than a small additional yield of juice. In one instance I find that 15,000 lemons yielded 104 gallons of juice. A case of

400 lemons pressed a few days ago yielded 4¼ gallons of juice, a very much larger proportion, but the juice was of very inferior quality. Each carboy of juice was tested immediately after pressing, and the results are given below.

The amount of acid present is ascertained by titrating 1 fluid ounce, measured with a pipette of known accuracy, with normal caustic soda, using phenolphthalein as an indicator. The number of cubic centimetres of normal soda solution used multiplied by 1·078 gives the weight of crystallized citric acid in grains. But it must be remembered that phenolphthalein indicates an alkaline state of the solution, and in working with these quantities the neutral point should be reckoned as 0·1 c.c. less than that shown by the burette. With juice of known origin, where sophistication is out of the question, this method leaves nothing to be desired. Very careful experiments have shown that results obtained by titration are quite as accurate as those obtained by previous precipitation as calcium salt; in neither case is the absolute amount of citric acid ascertained, but simply titration tells truly the total acidity, and for our purpose we may consider this as due entirely to citric acid.

The following table shows the results obtained in those instances in which notes were kept during the past season:—

Month.	Lemons. No. of cases.	Lemons. Average no. of lemons, per case.	Citricity.
November . . .	38	416	31·3 33·0 33·5 34·5 30·2 30·8 34·6 35·6 32·9
December	25	425	29·2
	3	480	33·5
	2	486	32·9
	1	410	33·5
	1	415	32·5
	1	420	30·3
	1	415	34·0
May	2	350	29·2
August	1	405	22·6

The PRESIDENT said lemon juice was an article they frequently came into contact with, but they evidently had something to learn with regard to it. It was evident lemons should be selected for pressing principally in the winter months, and it was quite clear that the percentage of acid was 30 per cent. less in the summer than in the winter. The superiority of the lemons, not only in acidity, but also in the essential oil of the peel, was also very marked in the winter months.

Mr. LINFORD asked whether the lemons dealt with in the experiments were Messina or Naples lemons. According to his experience the latter had the larger amount of juice, but the smaller amount of citric acid, and the peel contained less essential oil than the Messina lemons. Some years ago he remembered some lemon juice being ordered, and he sent out true lemon juice, but the doctor came back to know why he had sent artificial juice, which would not effervesce with the mixture. He then sent some more, with the same result, and on examining the lemons he found they were perfectly sweet, and contained no acid whatever, and twice since then he had met with perfectly sweet lemons.

Mr. NAYLOR asked how far the percentage of acid was influenced by the maturity of the lemon?

Mr. SCHACHT said he remembered a paper being read some years ago by Mr. Stoddart on this question, and the discussion which arose upon it, from which it appeared that it was the unfortunate habit of medical men to order so much fresh lemon juice to be taken with a definite amount of carbonate of soda or potash, inasmuch as at certain times of the year very much more of the alkaline carbonate would be required to produce the desired effect, which was probably something like neutrality. At that time Mr. Stoddart went through some elaborate experiments, the result of which was that lemons gathered at certain times were found to be much more acid than at others. In those days the importation of lemon juice had not reached the immense volume it now had, and consequently very little lemon juice was then used except that recently expressed. It was settled then that it was a little unfortunate that there was not supposed to be any standard acid strength of lemon juice. He should like to know whether fruits imported at certain times were supposed to represent the fruits gathered at that time.

Mr. CONROY said he gathered from the author of the paper that he obtained on an average about 32 grains of acid to the fluid ounce. He had had considerable experience in testing lemon juice, and he must say he had found it to contain much more than that. Thirty-two grains only worked out about 7 per cent., whereas he generally found that fresh lemon juice prepared in the months of December, January and February, those being the months in which lemon juice was pressed, the lemon juice of commerce being a bye-product obtained in the manufacture of lemon peel, yielded on an average about 8·7 per cent of free citric acid. His mode of testing was similar to that adopted by the author, but as he had many hundreds of samples to test representing puncheons of juice, he made a standardized soda solution, 1000 fluid grains of which represented 100 grains of citric acid. By standardizing the solution in that way the percentage could be read straight off immediately after titration. It might be that he was under a misconception in reference to the percentage given by the author of the paper, but his experience was that 8·7 per cent. was a very fair average, and he had frequently found lemon juice which tested over 10 per cent. of citric acid, equal to 1 lb. of citric acid per gallon.

The PRESIDENT asked if Mr. Conroy referred to imported lemon juice, or that pressed in England.

Mr. CONROY said he referred to that pressed in this country by manufacturers of candied lemon peel. The imported lemon juice was much weaker.

Mr. W. H. SYMONS said the percentage mentioned by Mr. Conroy represented about 39 grains to the fluid ounce, while Mr. Williams recommended from 30 to 36 grains as the standard. It was well known that lemons varied very much, especially during the summer months, those which had been stored from the early crops being less acid than those more recently gathered, and perhaps those most suitable for Mr. Williams's purpose for manufacturing tincture would not be suitable for the manufacture of citric acid.

The PRESIDENT asked if Mr. Conroy knew whether the makers of candied peel used Messina or Palermo lemons? It was possible that in one case the peel might be superior, but there might be a difference in the amount of acid in the juice.

Mr. CONROY said that was a question he could not answer. He had heard, but he had confused the two names, and did not know which it was.

The PRESIDENT said good judges of essence of lemon could tell the difference between the essential oils obtained from different varieties, and it was possible there might be some slight difference in the juice of the two fruits.

Mr. CLARK (Leicester) said it was the Messina lemons

that were pressed in such large quantities abroad, and the peel came over in puncheons packed in salt.

The PRESIDENT remarked that Mr. Stoddart's paper referred to freshly expressed lemon juice, and his proportions were 31·09 to 31·5 grains of citric acid to the ounce. Those figures rather agreed with the average given by Mr. Williams.

Mr. CONROY said if he remembered Mr. Stoddart's paper rightly, he pressed the lemons himself; but the lemon juice from a presser, obtaining many puncheons at a time, was more likely to give an average sample than Mr. Stoddart could have obtained by buying a few lemons himself. Mr. Williams had mentioned that the lemons were pressed by hydraulic power, but he knew a very large manufacturer, Mr. Hartley, of Bootle, whose lemon peel went all over the country, who used a lemon squeezer invented by himself. He simply got the lemon juice as a bye product, as he wished to preserve the peel intact for preserving purposes. He forgot to mention before with reference to the titration that he found as soon as he got the lemon juice slightly alkaline it was a sufficient indicator of itself; it turned immediately a bright yellow with the least excess of alkali, so that there was scarcely any necessity to use an indicator.

Mr. MACLAREN asked if in both cases referred to peeled lemons had been dealt with.

Mr. WILLIAMS said in all cases they peeled the lemons.

Mr. SCHACHT said Mr. Stoddart found that the same lemons when kept a certain number of months lost their acidity. On May 28 he bought a lot of lemons from six different shops, and after mixing them, pressed eight, which gave 7 ounces of juice having specific gravity 1·040 to 1·046 and yielded 40 to 46 grains per ounce of citric acid. The remainder was put aside again to the end of May and again examined, when the result was an average of 41 grains of citric acid. The lemons kept on decreasing in acidity, at first slightly and then rapidly, but the specific gravity only suffered a slight diminution, and in July it was 1·027, but had lost all the citric acid.

Mr. CONROY said that rather bore out his statement.

The PRESIDENT said the Conference was much obliged to Mr. Williams for this paper. Of course they were concerned in seeing that the standard in the British Pharmacopœia was not too high, and when a statement was made that lemon juice should contain 40 to 46 grains to the fluid ounce, and when they found in the summer months freshly-pressed juice only contained 26 grains to the ounce, it was rather an important difference, and they should know what they were about, or some day something would take place which would be a great annoyance to somebody. He himself should read this paper with great interest, and should turn back to that of their lamented friend, Mr. Stoddart, and read the two together, and he had no doubt on comparing them they would get pretty nearly accurate results.

Mr. WILLIAMS in answer to Mr. Linford said the juice referred to was obtained from Messina lemons imported by his firm in lots of about 200 cases, especially ordered to be packed so as to arrive in England as quickly as possible, and before they had quite lost their green colour. The lemons then showed the greatest amount of acidity, for the longer they were kept the more the acidity diminished. He had also tried Palermo lemons occasionally, and although he found some difference it was not very great, probably on the whole the acidity was rather less. He had adopted all sorts of presses, sometimes having to press small quantities, and in preparations made for the manufacture of beverages they always had to make it up to a standard strength of acidity, and therefore were obliged to ascertain whether there was a deficiency of acidity in the juice or not, even in very small quantities. There was no doubt that as the lemons matured and got ripe they became much sweeter; there was more juice but much less acid. He never came across any imported lemon juice except concentrated, and was not aware that fresh lemon juice was ever brought to this country. His experience with lemon juice obtained from pressers who made candied peel, such as was referred to by Mr. Conroy, was somewhat different, for he generally found it only contain about 27 grains per ounce. That was from pressers in London, but of course it was quite impossible to say that it was not sophisticated; the volume might be increased by dilution, so that he did not place much reliance on results obtained from such purchases. In all cases the lemons were peeled because the peel was the most important product in their estimation. The small correction was not a matter of great importance, but he thought it necessary to use phenolphthalein as an indicator, and to check the results in other ways. The singular part of it was this, that he had never yet found lemon juice to contain more than 36 grains per ounce in any case, and the results had been checked by many other people. He had discussed the matter with people who said they had obtained lemon juice from wholesale houses containing more than 36 grains, but he found on inquiry at well known houses that they never could obtain lemon juice of that strength themselves, but were careful to meet the requirements of the Pharmacopœia by adding citric acid.

The British Association for the Advancement of Science.

ADDRESS TO THE CHEMICAL SECTION.

BY SIR LOWTHIAN BELL, BART., F.R.S., F.C.S., D.C.L.

(*Concluded from page* 259.)

After the invention of the blast furnace pig-iron was placed in a similar hearth, and while in a melted state a blast of air was directed upon the molten metal, until just as much carbon remained with the iron as constituted steel. This mode of procedure continued to be practised long within my own recollection, and may, for what I know, still be followed in some districts. The subject of steel-making occupied the attention of Hassenfratz, of Réaumur, and others, but practically the only process followed until 1865 was the well-known one of cementation.

Since the days of Fourcroy it was ascertained that in addition to the iron carbon was an essential ingredient in cast metal, but invariably accompanied by more or less silicon, and whenever the minerals contained sulphur or phosphorus these metalloids were also present. The nature of the actions employed for ridding the product of the blast furnace of these substances so as to render it malleable had also been carefully examined and explained by the light of scientific investigation. The manufacturer had, it is true, learnt by experience and observation how to produce an article of excellence without much knowledge of the science of his art. Among other things he ascertained that to obtain a ton of wrought iron he required the heat of an equal weight of coal in the puddling furnace; but he did not know, nor did even men of science, I think, ever dream, that the oxidation of the metalloids in the pig-iron, and that of a small portion of the metal itself, would afford heat enough to enable the workman to dispense with the use of all coal in the process of conversion. When, therefore, the iron trade was informed in a paper read before the British Association in 1856, entitled "A mode of making iron without the use of fuel," its author, Henry Bessemer, was set down by the iron trade as a deluded enthusiast. At that

period I doubt whether 10 lbs. of wrought iron had ever been seen in a state of fusion at one time. Bessemer in his description, however, spoke of melting tons of it with no more heat than that afforded by the rapid oxidation of about five or six per cent. of the weight of the pig-iron used. Not only therefore was the subject one of economic but also of high scientific interest. Nevertheless, a mere statement of the title of the paper was all the notice bestowed by our predecessors in their "Transactions" on a discovery which has revolutionized the art of making iron. It is quite true that for some time it appeared as if the scientific aspect of the question were to constitute its only recommendation, for the malleable iron made in a Bessemer converter proved unmanageable when hot, and destitute of strength when cold. Finally it was ascertained that phosphorus was the source of the evil, and, further, that while carbon and silicon could be almost entirely removed from the molten metal, this third metalloid remained unaffected by the treatment. The extent to which the hurtful influence of phosphorus makes itself felt in the wrought iron obtained by the Bessemer process is somewhat remarkable, because while two to three-tenths per cent. is often present in puddled bars of fair quality, probably no consumer would accept Bessemer steel when it contains half of this amount. The first success was obtained in Sweden, where by using pig-iron containing a mere trace of the objectionable substance a product was obtained which was satisfactory. For many years the beneficial effect produced by manganese on steel had been well known, and it occurred to R. F. Mushet, son of David Mushet, one of, if not the earliest scientific metallurgist in the United Kingdom, to try its influence in the converter on iron made from the hematite iron of the West of England, which contained from ·05 to ·1 per cent of phosphorus. This addition, apparently by its removing occluded or combined oxygen in the molted iron, afforded the necessary relief, and the operation being one of extreme simplicity enables steel or wrought iron to be produced at a greatly reduced cost. To such an extent has this been carried, that ore is brought by sea over a distance of 1000 miles to Middlesborough, and from it steel rails are made more cheaply than a greatly inferior article of iron can be produced from the abundant and economically wrought bed of ironstone found within a couple of miles of that town. As an example of the facility of conversion may be adduced the fact that the molten metal is brought direct from the blast furnace, turned into steel or ingot iron as the case may be, and the heat evolved by the operation is sufficient to enable the product in many cases, without further use of fuel, to be taken direct to the mill, and rolled into a finished bar.

We have just seen that ·1 per cent., or thereabouts, in phosphorus renders steel or ingot iron valueless; in like manner very insignificant variations in the quantities of carbon or silicon materially affect their quality. Now the blow, as it is termed, in a Bessemer converter may be accomplished in from twelve to fifteen minutes. It is clear, therefore, the opportunity of ascertaining the precise quality of the steel is one of very short duration. It is, I think, not disputed that a product can be obtained by this process possessed of very high, if indeed not of the highest, excellence, but it is also pretended that the quality is not sufficiently uniform for certain purposes. The ordinary reverberatory furnace is incapable of affording the necessary temperature for melting steel or wrought iron, but by employing the fuel in a gaseous state, and by heating the air and gas before they are brought together, as is done in the valuable furnace suggested by the Messrs. Siemens, the heat is so intensified that wrought iron in it is rapidly fused. Steel is now largely made in such furnaces, either by mixing wrought and cast iron, as proposed by M. Pierre Martin, or by means of cast iron alone, when the carbon is removed by the addition of iron ore and some limestone, in which case, by the agency of the ore, the metalloids are oxidized and removed from the bath of iron. Some hours being required for this, sufficient opportunity is afforded for ascertaining the progress of the operation.

The cause of the iron in the Siemens furnace, as well as in the Bessemer converter, retaining its associated phosphorus in time began to attract the attention of chemists. In each case the expulsion of the metalloids is effected by oxidation. The carbon is gasified, and the silicium, on being acidified is absorbed and forms a slag containing usually 40 to 50 per cent. of silicic acid. In the presence of such an excess of this substance, any phosphoric acid, if formed, could not be absorbed by the slag. It was the late M. Grüner, of Paris, who, in 1867, first pointed out this fact, and he it was who first recommended the use of lime in order to render the slag basic instead of acid. Further, in order to avoid the presence of silica, he recommended at the same time that the converter should be lined with lime instead of with fireclay.

The same subject engaged my own attention, when guided by the fact that, as oxide of iron in the puddling furnace was capable of acidifying and removing a large quantity of the phosphorus as iron phosphate, it might be possible by keeping the temperature of the metal below that required for the process of puddling to make this removal more complete. The result of these experiments was communicated to the Iron and Steel Institute in March, 1877, when it was shown that pig-iron containing 1·75 per cent. of phosphorus could in a few minutes have this reduced to ·2 per cent. This process is now being used in the United States for freeing cast iron from its associated phosphorus.

The rapid destruction of the ordinary Bessemer converter led Mr. G. I. Snelus to consider the practicability of using a lime lining, and on experimenting with this on a working scale he confirmed the opinions previously enunciated by Grüner by observing that the presence of lime had removed a considerable quantity of the phosphorus. These discoveries constitute the foundation of the very important basic process of Messrs. Thomas and Gilchrist, which consists in adding lime to the molten steel in a converter constructed on the principle described by Mr. Snelus. Considerable difficulty had, however, been experienced by this metallurgist in the attachment of the lime lining to the walls of the converter. This important question was solved by Mr. Edw. Riley by exposing dolomite to a very high temperature in order to prevent further shrinking, and then grinding and mixing the powder with coal tar. This formed a species of cement which is applied to the sides and bottom of the converter in the form of bricks or as cement. Doubtless, simple as the idea is, it has greatly contributed to the success of the basic process.

The acidification and subsequent transference to the slag of the phosphorus by the basic treatment has led to its application to agriculture. For this purpose the slag is ground to a fine powder and sprinkled over the land without any further preparation. By this operation an indispensable element of animal life is derived from the remains of living creatures which ages ago found a grave in the ferruginous mud destined to become the great Cleveland bed of ironstone.

Before closing this portion of my official duty, I cannot refrain from tendering to chemists an assurance of the great advantage the manufacturers of iron feel they have derived from the lessons taught them by chemical science. I am the more anxious to do this because we, among others, have been reminded that we are losing the supremacy among industrial nations we once enjoyed for want of that knowledge of chemistry which is more assiduously cultivated abroad

than it is in our own country. I am not prepared to deny that the opportunities for acquiring a scientific education are less generally spread here than is the case in France, Germany, or Belgium, but for this the nation, and not the iron trade in particular, is responsible. It must also be admitted that as manufacturers we no longer stand so far above other lands as we formerly did. In this result any differences of education are in no way concerned, for if I were to classify the nationalities of the various inventions enumerated in the course of my remarks the fears of those who are alarmed at the appearance of a Belgian girder or a German steam-engine on our shores would, I think, be allayed. Perhaps I might be allowed to offer a very few words on the technical side of this important question of education. Much I shall not be able to say, because I have not yet been able to learn the precise position the subject occupies in the minds of its most earnest advocates. If it means, as is sometimes alleged, a system by which, along with scientific instruction, manual dexterity in the use of tools or a practical knowledge of various manufacturing processes has to be acquired, I confess I am not sanguine as to the results. Certain I am that if foreign workmen are more skilful in their trades, which, as a rule, I doubt, and which in the iron trade I deny, this superiority is not due to scientific training in the manner proposed, for in this they possess, as far as I have seen, no advantage over our own workmen. My objection to the whole system is the impossibility of anything approaching a general application being practicable. I have not a word to say against the rudiments of science being taught wherever this is possible. The knowledge so obtained may often give the future workman a more intelligent interest in his employment than he at present possesses, but I think they who expect much good to attend such a thin veneer of chemistry or physics do not take sufficient account of the extent of the knowledge already possessed by more highly educated men who are now directing the great workshops of the world. It is by extending and enlarging this that substantial aid has to be afforded to industry and science, and not by teaching a mere smattering in our primary or any other schools. In the case of young people who from necessity must leave the schoolroom at an early age, my own leaning is towards the present system, with the addition of drawing and some natural science. By it certain important lessons are taught, which, if not followed under the discipline of the schoolmaster, run some risk of being entirely neglected. After this, probably, the playground will be found more useful and much more popular with schoolboys than trying to learn a trade by means of tools which, before he has to use them in earnest, may be thrown into the scrap heap.

As a national question the attention of the Government, Imperial or municipal, ought to be directed to the importance of establishing in all great manufacturing centres institutions resembling that of the Physical College of this city. These should consist of appropriate and even handsome buildings, properly furnished with all the instruments and appliances required for teaching the sciences in their practical bearings on industrial pursuits. In Newcastle, as well as in other places, this has been done on a fairly ample scale, and the advantages the College of Science in this city are capable of affording are offered on such terms that no one can plead expense being a barrier to mental improvement.

Bearing in mind the importance of the subject, and remembering, as my colleagues and myself do, the difficulties we have had to encounter and those we have still before us, I am strongly of opinion that the erection and maintenance of colleges of science should not be left to the accidental liberality of the few, but should be taken in hand by the nation at large.

Obituary.

HAROLD WOOLLEY.

We regret to have to record the death, as the result of a sad accident on the 15th instant, of Mr. Harold Woolley of the firm of James Woolley and Sons, Market Street, Manchester. It would appear that a two-gallon bottle containing nitric acid having burst in the cellar of the establishment of the firm, water was thrown on the acid which had escaped on to the floor and subsequently whiting was used to neutralize the remaining acid. Mr. Harold Woolley, hearing of the accident, went to superintend the operations, and whilst doing so must have inhaled a quantity of nitrous fumes that caused his death. So far as observation went there is nothing known that would account sufficiently for the fatal result from such an apparently trivial accident. It can only be surmised that Mr. Woolley was either more exposed to the vapour than the others present, or that he was more susceptible to its effects. However this may be, Mr. Woolley does not seem to have complained of any particular inconvenience at the time of leaving business on the day of the accident; but the same evening he obtained medical advice, and although the symptoms were not then considered to be urgent, he was unable to go to business on the following morning and died in the course of the afternoon. Mr. Harold was the youngest son of the late Mr. James Woolley, one of the earlier members of the Council of the Pharmaceutical Society, and was in his thirty-ninth year at the time of his death. After studying at Owen's College and at the School of Pharmacy, Bloomsbury Square, where he was a prizeman in 1871, he entered the business of Messrs. Woolley and Sons in 1872, where he took charge of the scientific apparatus and surgical instrument department. Mr. Woolley became a member of the Pharmaceutical Society in 1872.

Notice has also been received of the death of the following:—

On the 18th of October, Mr. James Slipper, Chemist and Druggist, of Brunswick House, Hampstead. Aged 73 years. Mr. Slipper was a member of the Pharmaceutical Society for forty-six years, and in 1879 was elected a member of the Council, but retired at the end of the year.

On the 2nd of October, Mr. Thomas Styan Pearson, Chemist and Druggist, Bank Street, Maidstone. Aged 33 years.

On the 15th of October, Mr. William Willan, Chemist and Druggist, Friargate, Preston. Aged 38 years. Mr. Willan was an Associate in Business of the Pharmaceutical Society.

On the 17th of October, Mr. James Brogden Marsden, Chemist and Druggist, Blankett Row, Hull. Aged 48.

On the 19th of October, Mr. Andrew Ross, Chemist and Druggist, Castle Street, Aberdeen. Aged 55 years.

On the 19th of October, Mr. George Coverdale Jones, Chemist and Druggist, York Town, Surrey. Aged 40 years. Mr. Jones was an Associate of the Pharmaceutical Society.

ANSWERS TO CORRESPONDENTS.

Student will find full information respecting all the compounds named by consulting the indexes of the Journal.

A. H. Samuel.—See the paper on 'Frankincense,' by Dr. Birdwood, in *Pharm. Journ.*, [3], vol. i., p. 163, and on 'Perfumes,' vol. iii., pp. 803, 825.

T. J.—*Hypericum calycinum* and *Nepeta Cataria.*

Aq. Flor. Aurantii.—*A. J. Dyer* asks for information as to what is usually dispensed when aq. flor. aurantii is ordered. As the language of the B. P. remains still very indefinite upon this point, the opinions of correspondents as to the practice is invited.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Welborn, Clower, Atkins, Jankowski, Wright and Co., Richardson, Associate in Business, M. P. S.

"THE MONTH."

Chloralamide.

The results following the administration of the new hypnotic, chloralamide (*ante*, Aug. 31, p. 161), to a number of hospital patients have been communicated by Dr. D. R. Paterson, of Cardiff (*Lancet*, Oct. 26, p. 849). It was given in fourteen cases of insomnia, including simple sleeplessness and that consequent upon phthisis, heart disease and enteric fever. Upon the whole the results obtained were encouraging, for although the action of the amide is not quite so rapid as that of chloral hydrate, sleep coming on from half an hour to an hour after its administration, this is considered to be more than compensated for by the almost entire absence of action upon the circulation. The new hypnotic, however, appears to be not quite free from some of the disadvantages attending the use of others, since in some instances doses of 30 grains and 45 grains were followed by giddiness, feeling of sickness, dryness of mouth and even slight delirium. As a rule sleep lasting about eight hours followed its administration, and in cases of phthisis its influence in restraining sweating was very marked; but the insomnia and restlessness due to pain were little, if at all, affected by it. Dr. Paterson thinks some of the published doses to be much too large, at least to begin with, especially if the patient has been ill some time. He has found that usually from 30 to 45 grains is sufficient for a man, while 20 to 30 grains will give satisfactory results in a woman.

Somnal.

"Somnal" is the suggestive name applied to what is described as "ethylirtes chloralurethan," and represented by the formula $C_7H_{12}Cl_3O_3N$ (*Pharm. Zeit.*, Oct. 5, p. 611). It was at first described as being prepared from chloral, alcohol and urethan, and as differing from the compound recently introduced as "chloralurethan," by containing 2C and 4H more in the molecule; also as melting at 42° C., boiling in a vacuum at 145° C., and as not being altered by the addition of silver nitrate or by acids. As the crystals are very deliquescent the preparation appears to be sent out dissolved in alcohol, in which it is soluble to the extent of three parts in one. The advantage claimed for "somnal" is that when administered in two gram doses it induces within half an hour a quiet sleep that lasts from six to eight hours without any inconvenient bye effects. It is not unimportant to add, however, that Herr Lutze, writing to the *Pharmaceutische Zeitung* (Oct. 26, p. 652), has claimed that somnal is none other than chloralurethan under a new name and that the addition of the word "*ethylirtes*" is simply a blind. This statement has, however, evoked a denial from Herr Radlauer, who now affirms that it is a product of the direct combination of chloral alcoholate and urethan in a vacuum apparatus and that its composition is correctly represented by the formula—

$$CCl_3-C(-H)(-OC_2H_5)-NHCOOC_2H_5$$

Formyl-amido-phenol ether.

Formyl-p-amidophenol ether, which would be a compound corresponding to phenacetin, but with a formyl group in the place of an acetyl group, is the subject of a recent patent (*Pharm. Zeit.*, Oct. 12, p. 625). It is described as being made by heating together definite quantities of the hydrochloric acid compound of p-amidophenolethyl ether, sodium formate and formic acid in a vessel connected with a reflux condenser, and separating the formyl compound that is formed by boiling the fused mass with water. On cooling the water deposits it in handsome white brilliant tasteless scales, melting at 69° C., slightly soluble in cold water and readily soluble in hot water, ether and alcohol. The new compound differs from phenacetin, or acetphenetidin, in possessing scarcely any antipyretic property; but on the other hand it is said to act to an extraordinary degree upon the spinal cord, abolishing the action of strychnine, and to be available therefore as an antidote or in the treatment of the tetanic condition.

Double Salts of Mercury and Thymol.

According to the terms of a patent taken out by E. Merck for the preparation of compounds of mercury with certain phenols (D. R. P., 48539) the process adopted is as follows (*Pharm. Zeit.*, Oct. 12, p. 625): A warm solution of mercuric nitrate, moderately acidulated with nitric acid, is poured in small quantities at a time, during stirring, into a warm alkaline solution of thymol, as long as the yellow precipitate that forms is redissolved. The liquor is then allowed to stand and upon cooling forms a crystalline paste, consisting of felted needles of the double compound of mercuric thymolate and nitrate. This is purified by recrystallization from dilute soda solution, in which, when warm, it is freely soluble. Another way is to pour the warm weakly acidulated solution of mercuric nitrate into an alcoholic solution of thymol, this mixture also upon cooling forming a paste of soft felted needles. The former plan has so far the disadvantage that the alkaline solution of thymol becomes slightly coloured, so that the product is not purely white, in addition to affording an opportunity for the formation of sodium nitrite, which requires considerable washing for its removal. The pure mercury-thymol double salt is said to be perfectly colourless and odourless, but it gradually becomes reddish, especially if exposed to daylight, and acquires a faint thymol odour. When mercuric nitrate and thymol are used the salt formed is represented by the formula $(C_{10}H_{13}O)Hg-Hg(NO_3)$; but when mercuric acetate is used the formula is given as $(C_{10}H_{13}O)Hg-Hg(C_2H_3O_2)$.

Strychnine and Brucine in Strychnos Preparations.

The results of some experiments reported upon at Heidelberg, by Professor Beckurts, as to the relative proportions in which strychnine and brucine occur in preparations of nux vomica, appear to have an important bearing upon the present mode of standardizing these preparations at present official in this country. Five different samples of extract of nux vomica were taken, the total alkaloids separated, and the relative proportions of strychnine and brucine present in them determined by taking advantage of the difference in solubility of the acid ferrocyanides (*Pharm. Centralh.*, Oct. 3, p. 574). The relative percentage proportions of the two alkaloids in these extracts were as follows:—

	I.	II.	III.	IV.	V.
Strychnine .	48	53·6	42·7	53·1	45·6
Brucine . .	52	46·4	57·3	46·6	54·4

It therefore appears that in the total alkaloids from these samples the relation of the strychnine to the brucine varied between 42 : 58 and 54 : 46. Assuming then that these extracts were all

standardized to contain 15 per cent. of total alkaloids, the one richest in strychnine would contain 8·1 per cent. of that alkaloid, while the poorest would contain only 6·3 per cent., or a difference of 1·8 per cent. According to Talk the physiological activity of strychnine is 38½ times greater than that of brucine, a difference so great that Professor Beckurts suggests that instead of standardizing upon the total alkaloids, it would be better to take into account the strychnine only, and ignore the brucine.

Ipecacuanha Alkaloids.

Apropos of a communication from Herr Geyger, as to amounts of alkaloid separated from different preparations from the same parcel of ipecacuanha, in which the largest quantity of emetine was attributed to the alcoholic and acid tinctures of the German Pharmacopœia, Herr Arndt calls attention (*Pharm. Zeit.*, Sept. 25, p. 585) to the disturbing influence that may be exerted upon emetine determinations by the volatile alkaloid that he has before described as occurring in the root (*Pharm. Journ.*, [3], xix., 505). This base is spoken of as forming at an ordinary temperature a yellow oil, solidifying when cooled to a low temperature to fine pearly crystals. The salts are represented as being crystalline and readily soluble, with the exception of the tannate and nitrate. The volatile base is supposed to exist in the root as a tannate, but when the conditions of the exhaustion of the root are favourable to the breaking up of this insoluble compound, and bringing the alkaloid into solution, the whole quantity, which is stated to be about 0·3 per cent., might get added to the total of emetine. According to Herr Arndt actual emetine varies between 0·6 and 1·1 per cent. of the cortical substance, and never exceeds 1·12 per cent.

Atropine, Hyoscyamine and Hyoscine.

Some experiments made by Professor Schmidt (*Pharm. Zeit.*, Sept. 25, p. 583) seem to establish the fact that the length of time belladonna roots are kept after collection has little influence on the alkaloid they contain, as practically only hyoscyamine, and no atropine, is found in full grown roots that have been kept for years. On the other hand there appears to be some relation between the alkaloidal contents and the stage of growth, for whilst in roots of one year's growth free atropine occurs together with hyoscyamine, only hyoscyamine is present in fresh old roots. Professor Schmidt also reports that he has now found that *Scopolia atropoides*, like *S. japonica*, contains both hyoscyamine and hyoscine, and that hyoscine, hitherto known only as a syrup, has been obtained in a crystalline form by Herr Bender. Traces of an alkaloid having a mydriatic action have also been found in *Solanum tuberosum*, *S. nigrum* and *Lycium barbarum*. From the residues of the conversion of hyoscyamine into atropine by Will's process (*Pharm. Journ.*, [37], xix., 245), a crystalline compound has been separated presenting some analogies to isatropine, the decomposition product (tropine) of hyoscine, but differing from it in crystalline form. Its occurrence suggests the possibility of the formation of another base, besides atropine, during the conversion, and it has been named "metatropine." In reference to the commercial preparations sold under the names "atropine" and "hyoscyamine," Professor Schmidt remarked that they are usually mixtures, and physiological experiments have hardly yet been made with the pure compounds. He mentioned that the more hyoscyamine sulphate a sample of atropine sulphate contains the finer would be its crystalline appearance, whilst the samples occurring as white granular masses would contain more atropine sulphate. Further if a solution of hyoscyamine sulphate containing atropine sulphate be allowed to evaporate spontaneously the hyoscyamine would gradually all be converted into atropine, as shown by a solution of the residue being inactive towards polarized light.

Eschscholtzia Californica.

Early in the present year (*Pharm. Journ.*, March 7, p. 703) a statement was made by Messrs. Adrian and Bardet to the effect that in the Papaveraceous *Eschscholtzia californica* there is present an alkaloid possessing all the characters of morphine, together with a second unidentified base and indications of a glucoside. At the recent meeting of German Naturalists and Physicians in Heidelberg, Herr Reuter stated that he had made a careful examination of a small quantity of the plant cultivated in Germany, but had failed to find any alkaloid that did not differ in its reactions from morphine (*Pharm. Zeit.*, Oct. 19, 635), though he confirms the presence of two alkaloids and a glucoside. One of these alkaloids was obtained as a crystalline hydrochlorate by treating a petroleum ether extract with dilute hydrochloric acid, and the other by similar treatment of an ethereal extract. They differed from morphine and from one another in their behaviour to sulphuric acid, the former giving with it only a faint yellow colour instead of orange-red and the latter an intense violet blue. Both differed from morphine also in not giving a blue colour with perchloride of iron. There was a further precipitation by potassium iodiodide, which was too small to be examined. It is proposed to continue the investigation upon wild-grown Californian plants.

Chelidonium Alkaloids.

Another Papaveraceous plant, the greater celandine (*Chelidonium majus*), was reported upon at the same meeting by Professor Schmidt, who stated that instead of the alkaloids in the root being limited to the two hitherto isolated, chelidonine and chelerythrine, he has recognized the presence of no less than twelve different bases in larger or smaller quantities. Only four of these have yet been studied, namely, chelidonine, to which the author attributes the formula $C_{20}H_{19}NO_5 + H_2O$; methylchelidonine, and α- and β-methylchelidonine, represented by the formula $C_{21}H_{21}NO_5$ (*Pharm. Zeit.*, Sept. 25, p. 582). A base having this latter composition, discovered by Hesse in opium and named by him "protopine," has also been recognized by Eykman in other Papaveraceæ and by Professor Schmidt himself in *Sanguinaria canadensis* and *Stylophorum stiphyllum*, and he also believes that the base supposed to be morphine discovered in *Eschscholtzia californica*, as referred to in the previous paragraph, will prove to be identical with methylchelidonine. It was further stated that these chelidonium bases have been ascertained to possess a weak morphine action physiologically.

Lobelia inflata and Lobeline.

The literature relating to the active principle of *Lobelia inflata* was already somewhat contradictory, and the latest contribution to it, by Dr. H. Dreser (*Arch. exp. Path. u. Pharmakol.*, xxvi., 237), does not lessen the diversity. According to this author the only active constituent of the drug is lobeline,

which he describes as a non-volatile, non-glucosidal alkaloid that by careful manipulation can be obtained partly as a beautifully crystalline platinum salt, but forming for the greater part a non-crystalline platinum compound. In their pharmacological action the two forms of lobeline are identical, warm-blooded animals being killed by them, when given in toxic doses, through paralysis of the respiratory organs. It will be remembered that about three ago (*Pharm. Journ.*, [3], xvi., 838), the occurrence of liquid and crystalline basic substances in lobelia leaves was reported, but these were then said to be distinct alkaloids. Subsequently (*Pharm. Journ.*, [3], xvii., 1038; xviii., 135) Messrs. Lloyd reported that they had failed to obtain from the plant any other than an amorphous alkaloid, which had not yielded to them crystalline salts. A crystalline substance that was at first thought to be a salt was found to have no alkaloidal relation, but to be something of the nature of a stearoptene or wax, to which the name "inflatin" was given.

Urtica Glucosides.

The common nettle has long had a popular reputation as a remedy in various disorders, but recently a decoction of the leaves has been strongly recommended as a hæmostatic in metrorrhagia. This has induced Herr Reuter to examine the *Urtica urens* and *U. dioica*, with a view to discover the active principle. He reports (*Pharm. Centralh.*, Oct. 17, p. 609) that his efforts to isolate an alkaloid were attended with negative results, but that from mixtures of the powdered dried herbs with milk of lime he has separated in each case a non-nitrogenous glucoside that is precipitated by potassium iodiodide, and reduces Fehling's solution only slowly when simply heated with it, but immediately and very strongly after being boiled with acids. The *Urtica pilulifera*, which has a reputation in the East as a powerful galactagogue, has also been examined by Herr Reuter, and has yielded a glucoside, but it does not appear whether it is identical with that from the other species.

Cascara Sagrada.

In a paper read before the American Pharmaceutical Association (*West. Drugg.*, Sept., p. 325), by Mr. Zeig, a slight increase to our knowledge of the constituents of the bark has been made. He has found, like previous investigators, three resins in an extract made with strong alcohol, but has ascertained that two of them are physiologically inactive, whilst the third possesses the purgative properties of the drug, five grains of it having a marked laxative effect upon an adult. The author also finds that if dilute alcohol be used very little of the inert resin is dissolved, and recommends treating the cascara bark, in number 40 powder, with a mixture of equal parts of dilute alcohol (presumably of U. S. P. strength) and water. The process of maceration in a percolator with subsequent percolation is adopted, the percolate being evaporated to a syrupy consistence and poured slowly into water containing hydrochloric acid in the proportion of 2 drachms to 8 ounces of the bark. The precipitate is washed and dried at a gentle heat. The resin thus prepared is contaminated by the bitter decomposition product of the tasteless glucoside observed by Meier and Webber, to which they attributed tonic properties (*Pharm. Journ.*, xviii., 804). It can, however, be obtained devoid of bitterness by dissolving it in solution of caustic potash and reprecipitating it by means of hydrochloric acid.

Cinchona officinalis.

In a note in the *Kew Bulletin* (Oct., p. 247), relating to cultivated Jamaica cinchona bark, some correspondence on the subject of cinchona is published which discloses the curious fact that fine old silvery Loxa bark of the H. O. brand is about twelve times as valuable as Jamaica bark, not on account of its larger percentage of alkaloid, but because it is used to give a peculiar bouquet to the tonic wine of cinchona that is sold largely in France. It would be interesting to know how far the aroma is due to the lichens on the bark, and how much may be due to the flavour of the bark itself, which in some varieties, as in *C. micrantha*, is strongly marked.

Wattle Bark.

In consequence of the reckless stripping of the wattle trees in Victoria for the "mimosa" bark of commerce, the Government of that colony has appointed a committee of inquiry as to the regulations that should be adopted to stay the evil. It appears that in Victoria as much as 12,000 to 15,000 tons of bark per annum are used, whilst the exports have in one year amounted to 9724 tons. It has been suggested that much of the waste bark could be worked up into "cutch," or terra japonica, which is now imported into Victoria at about £20 per ton.

Japanese Senega.

A senega from Japan, supplied by Professor Shimoyama of Japan to Professor Flückiger, has been examined by Herr Reuter, who finds that it yields to ether 9·6 per cent. of a yellow mass, consisting of 0·8 per cent. resin and 8·8 per cent. oil, which has an odour of patchouli rather than of wintergreen. The senega in question is referred to *Polygala tenuifolia* (*Pharm. Centralhalle*, Oct. 17, p. 609). The root is mentioned in the Catalogue of Japanese and Chinese drugs, by S. Tsudioka and J. Murai; it is not, however, referred there to this species, but to *P. japonica*, Houtt.

Echujin.

Herr Boehm reports upon the examination of two arrow poisons obtained in a journey by Dr. Schinz through South-west Africa (*Arch. exp. Path. u. Ph.*, xxvi., 164). One of them was the juice of an apocynaceous shrub, *Adenium Boehmianum*, called by the natives "echuja," and contains as its active constituent a glucoside having the same percentage composition as digitalin, which it also resembles in its physiological action, and which has been named "echujin." It differs, however, so widely from digitalin in some of its characters as to leave no doubt as to its being a distinct body. The other poison could not be identified as to its botanical origin, but was probably derived from the same or a closely allied source.

Crystalline Ethers of Albumose.

Although numerous communications have appeared at different times upon the decomposition products and reactions of albumenoid bodies, well-defined crystallized compounds or derivatives have not hitherto been described, and it is probable that as a rule operators have worked upon heterogeneous mixtures. This gives interest therefore to the announcement of Herr Schrötter that he has succeeded in preparing relatively well-characterized benzoic ethers of albumose, which are soluble in alcohol, yield no ash, and are quite free from

sulphur (*Berichte*, xxii., 1950). It may be convenient to recall here that the term "albumose" has been applied by Kühne and Chittenden to a group of compounds occurring as intermediate products in the conversion of albumen into peptone. The starting material was a mixture of albumoses obtained by precipitating a weak acetic acid solution of Witte's peptone with a concentrated solution of ammonium sulphate, redissolving the precipitate in dilute acetic acid and reprecipitating with strong alcohol. The moist precipitate of albumose was dissolved in 10 per cent. soda solution and shaken with benzoyl chloride, and this process was repeated several times. The white powder eventually obtained was extracted with boiling alcohol, which on cooling deposited white microscopic crystals of a body giving the biuret reaction, but containing no sulphur, from which 51·6 per cent. of benzoyl was separated by saponification. Upon distilling off some of the alcoholic mother liquor a yellow precipitate formed, which after purification by dissolving it in 95 per cent. alcohol and reprecipitating it by ether was obtained in white flocks, also free from sulphur, showing the biuret reaction and yielding on saponification 45·5 per cent. of benzoyl. Upon concentrating the alcohol-ether mother liquor to a syrup a crystalline paste formed, consisting of a third body, that also gave the biuret reaction, but very faintly ; it contained no sulphur and yielded 61 per cent. of benzoyl on saponification.

Ricin.

The poisonous principle present in castor oil seeds has been variously represented as an alkaloid, a glucoside and an organic acid. But as the result of an exhaustive chemical and pharmacological investigation, recorded in a lengthy treatise (*Arbeit. d. pharmakol. Inst. Dorpat*, part iii., p. 59), Herr Stillmark has come to the conclusion that it is an albumenoid body, identical with the "β-phytalbumose" separated from the dried juice of *Carica Papaya* by Sidney Martin and belonging to the class of unformed ferments. This substance, which has been named "ricin," may be prepared by exhausting well-pressed peeled ricinus seeds, reduced to powder, with a 10 per cent. solution of sodium chloride, saturating the clear percolate at the ordinary temperature with magnesium sulphate and sodium sulphate and keeping it in a cool place, when besides large crystals of the two sulphates, a white precipitate easily separable from these is formed. This is placed in a dialyser, with frequent changes of water, for six days, after which the residue is removed and dried over sulphuric acid and can then be reduced to a snow-white powder, which still contains 10 to 20 per cent. of sulphate. This substance is a most powerful poison, exercising a remarkable power of coagulation, so that the blood coming into contact with a minute quantity that has been absorbed is coagulated, blocks the lumina of the intestinal capillaries, and causes thrombosis and echymosis. Even when introduced subcutaneously the principal action of the poison appears to occur in the intestinal canal, and not at the place of injection. The lethal dose for a man weighing sixty kilograms is estimated as 0·18 gram, and it is stated that this quantity is contained in the press cake from 3 grams of peeled seeds. In view of this fact, that the residue from the pressing of castor oil contains such large quantities of a tasteless poison exceeding arsenic in toxic power, and at present not to be detected in the body by any known method, Herr Stillmark raises the question whether it should not be made compulsory upon manufacturers to burn the cake or render it harmless by a process of boiling that would destroy the ferment. Experiments were also made upon the seeds of nine other species of ricinus, as well as those of *Croton Tiglium* and *Jatropha Curcas*, and in each case a poisonous albumenoid substance was separated, similar to if not identical with ricin, and belonging to the class of ferments. It is pointed out by the author that the coagulating power of ricin explains the external application in some countries of crushed ricinus seeds as a hæmostatic.

Anthrax Albumose.

In a communication to the *British Medical Journal* (Oct. 12, p. 811), Mr. E. H. Hankin claims to have isolated from anthrax cultures an albumose that is capable of exercising a marked influence upon the development of the anthrax disease. He states that when this albumose is injected into an animal in too large a quantity it appears to cause death more quickly than an injection of the most virulent anthrax spores ; but that when only a very small dose is injected the system appears quickly to establish a tolerance of the poison sufficient to protect it against the subsequent action of the anthrax bacillus. If his conclusion proves to be correct it would seem to point to an improvement in the method of vaccinating animals against anthrax and possibly against other diseases. Mr. Hankin states that he isolated the albumose from anthrax cultures by the ordinary chemical method of precipitating it from solution by the addition of a large bulk of absolute alcohol, washing the precipitate thoroughly with absolute alcohol to remove ptomaines, drying, redissolving and then filtering through a Cumberland filter. A rough colorimetric determination of the quantity of the albumose in solution was made by comparing the biuret reaction with that of a peptone solution of known strength.

Solubility of Glass.

In a communication upon the influence of the composition of glass upon its chemical and physical properties, which was brought before the chemical section at the late meeting of German naturalists and physicians, some points were mentioned having a bearing upon the solubility of glass which has also recently been the subject of discussion in this country. Professor Weber stated that he had been in the habit of submitting glass intended for laboratory purposes to a preliminary test, which consists in exposing it under a cover, after being carefully washed, to the action of the vapour of concentrated hydrochloric acid for twenty-four hours. Under these conditions the glass undergoes as much change as would be produced by carbonic acid and moisture in a year (*Chem. Zeit.*, Oct. 2, p. 1304). As might be expected some sorts of glass are affected more than others by this treatment, and the kind which Professor Weber has found to be attacked least is that which approximates to the composition represented by the formula $6SiO_2,CaO,Na_2O$ (or K_2O), whilst a glass having the composition of $13SiO_2,CaO,3Na_2O$ proved very alterable.

Some interesting experiments made with the view of obtaining information as to the variations of temperature of trees as compared with that of

the atmosphere are recorded in the *Botanical Gazette* (Oct., p. 217). It was found as a general rule that the temperature of the interior of the tree was somewhat higher than that of the air, except during the warmer portions of the day, the maximum temperature of the air being generally between 1 and 2 p.m., and the minimum between 6 to 7 a.m. The comparative tables show that the heat is absorbed and radiated more rapidly in the outer layers than in the centre. Experiments made at a time when the buds were starting, to determine whether the chemical action carried on in the tissues gives rise to heat, led to the conclusion that it is extremely doubtful if the metabolic processes involved generate sufficient heat to influence the ordinary thermometer. A curious difference was, however, found in the wood of the oak and pine in winter. Contrary to the statements of Professor Prentiss, the author of the paper, Mr. H. L. Russell, found that the temperature of the pine was lower than that of the oak at all times, except during the latter part of the night and early morning. This is attributed to the thick coating of the leaves on the pine preventing absorption of heat by the trunk, since the larch, which has similar wood, resembles in the matter of temperature the oak rather than the pine. The further conclusion was arrived at that the direct absorption of heat is the main cause of the high temperature of trees, and that it is largely dependent on the character of the bark, smooth-barked trees being as a rule warmer than those with a thick bark.

Temperature of Trees.

Professor G. Arcangeli has communicated to the Botanical Society of Italy some interesting observations on the elevation of temperature in the receptacle of hymenomycetous and other fungi caused by respiration. The species experimented on were *Armillaria mellea*, *Phallus impudicus*, *Lepiota excoriata*, *Clavaria flaccida*, *Polyporus fraxineus*, *Clitocybe spinulosa* and *Scleroderma Geaster*. In all cases the excess of temperature of the receptacle over the surrounding air appears to rise regularly in the earlier, and fall in the later part of the day, attaining its maximum between noon and 2 p.m. The greatest excess recorded was in the case of *Lepiota excoriata*, 1·25°, about 1.30 p.m.

Heat evolved in the Respiration of Fungi.

In the last number of the *Annals of Botany* (p. 393) Mr. J. Bretland Farmer contributes an article on the morphology and physiology of pulpy fruits. After pointing out the very different sources of the pulp in different fruits, he gives detailed descriptions of its mode of formation in the elder, dulcamara, blackberry and ivy. The term berry is usually applied to fruits in which the pulp or succulent tissue is derived from the pericarp, but in *Daphne mezereon* it is formed not only from the pericarp but from the outer integument of the seed also. In *Citrus* it is due to hairs which spring into the ovarian cavities and become distended with fluid. In *Vitis* and *Solanum Dulcamara* the pulp is formed partly from the placenta and partly from the pericarp. In the latter, after fertilization of the ovary, the cells of the placenta grow out between the seeds so as to give them the appearance of being sunk in it, and this growth is continued until met by a similar growth from the pericarp, so that the cavity of the ovary is then filled up with pulpy tissue. The outermost layer of cells of the ovules also undergo a change, their inner and side walls becoming lignified and the outer wall becoming mucilaginous and forming part of the mucilage of the pulp, just as it does in linseed. The red colour of dulcamara berries is due to the appearance of a large number of chromo-plastids derived from the chlorophyll granules. At the same time that this formation takes place the starch in the fruit becomes changed to sugar.

Pulpy Fruits.

According to Herr W. Johannsen, gluten forms the main portion of the protoplasm in the amylaceous endosperm-cells of wheat, and is not the result of the action of any ferment. The so-called "gluten-layer" beneath the pericarp contains neither gluten nor any ferment, but small grains of a nitrogenous substance imbedded in fatty protoplasm, as well as diastase.

Gluten in the Grain of Corn.

In a paper read before the Paris Academy of Sciences (*Compt. Rend.*, cix., 628), M. Georges Ville shows that the composition of the soil influences plants in five principal characters, viz., the stature, the colour, the amount of carotine and chlorophyll, and the quantity of vegetation. A table is given showing the difference in stature and colour of plants of the common hemp according to the manure used, from which it is evident that this plant flourishes least in soil without manure, next in manure without potash, and in manure without nitrogen. The absence of lime and phosphate in the manure in the case of hemp did not interfere so largely with the colour and stature of the plants. It would appear, therefore, that rich manure is essential, at least, to the development of foliage.

Relation of Plants to Soil.

The latest addition to the British phanerogamic flora is *Arenaria gothica*, which was discovered in West Yorkshire, near Ribblehead, by a Skipton botanist, Mr. R. Rothesay, and identified by Mr. A. Bennett (*Journ. Bot.*, p. 314). A careful search in the north of Britain by anyone familiar with Scandinavian botany would probably add several more new plants to the number already detected during the last few years.

Arenaria gothica.

According to Mr. F. W. Anderson (*Bot. Gaz.*, p. 229), the leaves of *Anemone cylindrica* and *Anemone multifida* are used by the Indians of the Rocky Mountains for nasal and pharyngeal catarrh. The leaves are gathered before the seeds are quite ripe, dried, and reduced to a fine powder. The powder so prepared, when used as snuff, produces a stinging sensation, makes the eyes water, and taken in sufficient quantity produces violent fits of sneezing. When these symptoms have subsided the throat and nostrils become free and have a comfortable feeling. The leaves are also broken small and smoked, the smoke being expelled through the nostrils for the same purpose. The juice of the fresh leaves is hot to the taste, and is sometimes rubbed into the nostrils instead of the snuff being taken. From the symptoms mentioned it seems likely that these species contain anemonin, and that it is not all dissipated by the drying to which the leaves are subjected. Possibly some of the British plants of the same order, *e.g.*, *Ranunculus acris* or *Anemone Pulsatilla* might answer the same purpose.

Indian snuff.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 2, 1889.

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THE RELATION OF PHARMACY TO HYGIENE AND BACTERIOLOGY.

THIS is a time when pharmacists require to be on the alert to avail themselves of any suitable opportunity to extend the field of their business operations without falling into the common mistake of trying to do the business of everyone else as well as their own, and it may be acceptable to some of our readers at least to be made acquainted with a suggestion that was offered with that object by the reader of a paper in the Pharmacy Section of the German Association of Naturalists and Physicians. The subjects dealt with in that paper were Hygiene and Bacteriology, and though it was admitted that the discussion of these subjects was specially provided for in another section of the body it was thought that attention might also be directed to them in a general way from the point of view of their interest for pharmacists. In that sense the author of the paper, Mr. EDUARD RITSERT, pointed out that regarding hygiene as the science of maintaining and promoting health, it comprises a very wide field of observation and inquiry concerning the various conditions by which health is influenced. In the first place the general conditions of existence, the soil, atmosphere, water and food materials have to be considered, together with the micro-organisms that occur under various conditions in our immediate surroundings. In addition to these attention has to be directed especially to the dwellings and occupations of the people, as well as to the diseases to which they are locally subject, and the effects produced by the overcrowding of particular localities. In short all the conditions under which human beings live have to be taken into account, with the object of ascertaining all influences prejudicial to health and of devising means for counteracting their evil effects. Though hygiene was regarded as a matter of practical importance by many ancient nations, and especially by the Jews, Greeks and Romans, it was little regarded in the Middle Ages, when the medical art was in a low condition, and every disease was considered to be a visitation of Providence, which could only be remedied by prayer. Among modern civilized peoples, however, hygiene has been recognized as a matter of paramount importance, and the reader of the paper referred to gave credit to England for having shown the necessity for a rational attention to its requirements, and for having furnished an example of the measures to be carried out with that object. The development of hygiene in Germany was of later date, but having once gained a firm footing it has progressed in such a manner that the principles there established have also been recognized in other countries. In the same way that German pharmacy may be proud of having given to the world the great chemist LIEBIG, it may also be proud that from its ranks came Dr. MAX V. PETTENKOFER, the man who opened the way for the practical exercise of hygiene in Germany, and who first pointed out the needful methods of investigation based on scientific principles. At his suggestion a chair of hygiene was founded at Munich in 1865, and soon afterwards that example was followed at the universities of Leipzig and Göttingen.

The establishment in Berlin of an Imperial Health Department in 1876 gave a fresh impetus to the study of hygiene, as well as to the work of preventing adulteration of food and the investigation of infectious diseases. The labours of Dr. ROBERT KOCH in relation to splenic fever and other subjects of this kind led somewhat later to his appointment as a director of this department, and from that time important researches have been carried out upon disinfection and the etiology of tuberculosis that are of world-wide interest. These researches serve to show the uncanny enemies man has to deal with, and they have created a general desire to find, by the cultivation of Hygiene and its offspring Bacteriology, means of counteracting the insidious attacks of those enemies. In Germany no cost has been spared in pursuing that object, and in rapid succession chairs of hygiene were established at the Universities of Berlin, Greisswald, Giessen, Breslau, Freiburg, Halle, Jena, Kiel, Rostock, etc. It will probably not be long before hygiene is made a special branch of study at all German universities. Naturally, as hygiene is most intimately connected with medicine, the greater number of hygienists and bacteriologists are medical men. But there is ample scope for men in other occupations to contribute to the promotion of hygiene, which requires not only special medical knowledge, but also theoretical and practical acquaintance with other branches of science, such as chemistry, botany, physics, and meteorology. In this connection the mention of the names of PASTEUR and PETTENKOFER alone will serve to illustrate what may be done.

With this general sketch of the development and scope of hygiene, we may now proceed to con-

sider with Mr. RITSERT the relation it bears to the present state of pharmacy. The sciences that were once embraced by that art and medicine have been developed to a condition of independence that leaves pharmacy in the background. A still further limitation of the field of pharmacy has been brought about and is still progressing in consequence of the production of chemicals and other products on a large scale at such low prices that the pharmacist can no longer offer the products of his laboratory in competition with them. And, moreover, the free sale of drugs by general dealers has even in Germany begun to encroach upon what was regarded as the most indisputable right of the pharmacist to the exclusive sale of medicinal articles. Every year also prescriptions are becoming more simple, and all things considered it is probable that even under the more favourable conditions that obtain in Germany the field of pharmacy will be still more restricted if no effort be made for conservation, and by advancing with the spirit of the time, to acquire new ground for profitable activity. The increased demand now made upon those seeking admission to the pharmaceutical body in Germany is a sign of the desire to keep abreast of modern scientific progress. But as pharmacists must always keep in view the practical as well as the scientific aspects of their calling, it is suggested by Mr. RITSERT that both purposes might be served by turning attention to the study of hygiene and its methods of investigation. By qualifying himself for the examination of water, air, soils and articles of food or drink, as well as for conducting inquiries connected with bacteriology, the pharmacist would not only have extended the range of his scientific knowledge, but also opened up a new field for advantageous occupation.

The first meeting of the Chemical Society for the new session will be held on Thursday, November 7, at 8 p.m., when the following papers will be read: "The Isolation of a New Hydrate of Sulphuric Acid existing in Solution," by S. U. Pickering; "Further Observations on the Magnetic Rotation of Nitric Acid, and of Hydrogen Chloride, Bromide and Iodide in Solution," by Dr. W. H. Perkin; "On Phosphoryl Trifluoride," by T. E. Thorpe and F. T. Hambly; "On the Acetylation of Cellulose," by C. F. Cross and E. Bevan; "On the Action of Light on Moist Oxygen," by A. Richardson; "Anhydracetophenonebenzil," by Drs. Japp and Klingeman.

* * *

The London Section of the Society of Chemical Industry will commence its sessional meetings on Monday, the 4th of November, when a paper will be read by Mr. C. Napier Hake giving an account of a Borax Lake in California. At the next meeting, on the 2nd of December, Mr. Watson Smith will read a paper on "Variations in the Products of the Destructive Distillation of different Gas Coals heated separately in the same Retort under similar Conditions," and Mr. I. Hauff will read a paper on "Cresotinic Acid and its Applications."

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN EDINBURGH.

October 16, 17, 24 *and* 25, 1889.

Present on each day—Messrs. Clark, Dott, Gibson, Gilmour, Kinninmont, Nesbit, Maben and Stephenson.

Professor Sir Douglas Maclagan was present on the 16th, 17th, and 24th, on behalf of the Privy Council.

MAJOR EXAMINATION.

16*th.*—*Two* candidates were examined. *One* failed. The undermentioned passed, and was declared qualified to be registered as a Pharmaceutical Chemist:—

Cargill, David Allan .....Arbroath.

MINOR EXAMINATION.

16*th.*—*Ten* candidates were examined. *Five* failed. The undermentioned *five* passed, and were declared qualified to be registered as Chemists and Druggists:—

Barrass, Arthur ....Hingham.
Brislee, William Henry .....Liverpool.
Burn, James Robert .....Newcastle-on-Tyne.
Carruthers, Edward SandersonManchester.
Curtis, George.....Aberdeen.

17*th.*—*Fourteen* candidates were examined. *Eight* failed. The undermentioned *six* passed, and were declared qualified to be registered as Chemists and Druggists:—

Fallding, Harry Bennett .....Sheffield.
Grant, James ..... Elgin.
Grey, John Elston .....Edinburgh.
Innes, John .....Douglas.
Jamieson, William Bannatyne Rothesay.
Jones, Alfred Benj. Geo. Ernest London.

24*th.*—*Fourteen* candidates were examined. *Three* failed. The undermentioned *eleven* passed, and were declared qualified to be registered as Chemists and Druggists:—

Lord, William Butler.....Lancaster.
Lyle, William .....Rothesay.
Maries, Charles Alexander ...Liverpool.
Muir, George McCartney .....Cumnock.
Parker, Herbert George.....Scunthorpe.
Patrick, James.....Dunfermline.
Richardson, Harold .....Bradford.
Robertson, John Wright .....Dundee.
Robinson, Bernard Christopher. Wolverhampton.
Scott, William Henry.....Sandy.
Wheeldon, Edwin .....Warrington.

25*th.*—*Fourteen* candidates were examined. *Five* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Smith, Francis Joseph .....Edinburgh.
Smith, Robert .....Forres.
Spark, William .....Maryport.
Taylor, Joseph.....Manchester.
Welch, Geo. Richard Julians..Bradford-on-Avon.
Weston, John Henry .....Holyhead.
Wilkie, Adam Laidlaw .....Galashiels.
Wilson, William Potter.....Haddington.
Young, George Herbert.....Brigg.

MODIFIED EXAMINATION.

16*th.*—The undermentioned was examined, and was declared qualified to be registered as a Chemist and Druggist:—

Lupton, Edward .....Lower Place.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held at the Rooms, Great Russell Street, on Thursday, October 24. The President, Mr. Ellwood, took the chair. In the absence of the author, Mr. W. L. Williams, Honorary Secretary, read a paper on—

Bacteria.

BY F. DAVIS, B.SC.

The author commenced with a general description of bacteria, giving as an illustration the hay bacillus (*Bacillus subtilis*), multitudes of which are developed in an infusion of hay when exposed to the air, as rod-like bodies about one twenty-thousandth of an inch in diameter. Although the bacteria mostly resemble one another in being rod-like there is a vast difference in their manner of motion, and this has led to their classification as "vibriones," having a wave-like motion; "oscillariæ," having an oscillating motion, and so on. Just previous to the period of multiplying the bacterium becomes quiescent and shortly afterwards encysted, forming upon itself an external gelatinous wall which entirely encloses the original bacterium or protoplasm. The protoplasmic mass then divides into numberless granules, which increase in size, and eventually burst the gelatinous wall and become free; these in their turn immediately commence to go through the phenomena of multiplication. After giving reasons for not accepting the theory of a spontaneous generation of these organisms, the author referred to the micrococci, which are mostly round or elliptical. These multiply by simple division and not by germination; that is a diplococcus or streptococcus is formed and multiplication is thus effected. Without attempting to draw a line of demarcation between microbes of the vegetable and those of the animal kingdom the author said it would be sufficient for the purposes of the paper to understand that every ferment has its specific microbe. The micrococci have two principal divisions, the *Micrococcus zymogens* and the *Micrococcus pathogens*, besides which there are two less important divisions of the chromogenic, or colour makers, and the septic micrococci. Some micrococci require free oxygen, others do not. The former, which are called aerobies, are illustrated by the top yeast used in the fermentation of English beer; the latter known as anaerobies, by the bottom yeast used in the fermentation of German beer. The author stated that nearly all fungi may be destroyed by the application of a solution of copper sulphate, this explaining why farmers dress their seed wheat before sowing. Bacteria exist in all departments of life. Sulphurous springs are due to the presence of a microbe, really an alga, capable of reducing sulphates. Saltpetre is formed in India and Peru by the action of bacteria in soil containing organic matter and carbonate of potash or soda. These nitrate bacteria are aerobic and hence the saltpetre is found on the surface of the soil only. The greenish matter developed sometimes in a suppurating wound is the product of a chromogenic microbe. Many bacteria appear to be altogether harmless, such as *Leptothrix buccalis*, which is always present in the saliva. Many others are harmless in the saliva and digestive canal, but are immediately productive of disease if they gain access to the blood through ruptured mucous membrane. This the author considers to be proof that bacteria in different phases of existence are capable of producing different results. Human saliva containing the *Micrococcus Pasteuri*, injected into rabbits, has proved fatal, whilst saliva from the same individuals, taken at another time when it was free from those organisms, was inert. Recent researches have shown that many apparently inert bacteria assist materially in the digestive process. In all cases of contagious disease bacilli may be found in the body after death. Anthrax, or splenic fever, swine plague, typhoid fever, and small pox all have bacilli characteristic of themselves. In some cases, according to the disease, these are found in the blood; in others they may occur in the mucous membrane, the malphigian capsules of the kidneys or the globules of the liver. The presence of bacteria in the blood is no doubt characteristic of various diseases, but whether the bacteria themselves or their secretions are the immediate cause of the disease is open to discussion. The cholera bacillus, which confines itself to the mucous membrane of the intestines, and does not appear to enter the blood, developes in an alkaline liquor, but is killed by one that is acid, whilst in dental caries the bacteria carry on their work best in an acid liquor. The author then referred to the preventive treatment for some diseases, such as small pox, hydrophobia and anthrax, and to the theories that have been advanced as to the effect of the introduction of an attenuated virus into the blood. In respect to antiseptics the author said that mercuric chloride occupies the premier position, but cannot always be employed with safety. From experiments conducted by himself he has found sulphurous acid to be the most effectual, and after this the following substances in the order named:—Chlorine, permanganate of potash, salicylic acid, carbolic acid and boracic acid. Iodine and bromine are also active germicides. The author concluded by giving a few instructions as to bacteria cultivation.

The President (Mr. Ellwood) was sorry Mr. Davis had not suggested a system of classification. For himself he recommended the one adopted by McNab. In that system the Bacteriaceæ are divided into four tribes, and two of these are again divided. A question which occurred to him in connection with the subject was this—Was it possible for one bacterial form to pass into another, and if so, would it be right to include the new form in the same species as the parent. He had hoped to obtain some fuller information respecting the cultivation, collection and preservation of bacteria, and referred to Koch's researches in that connection. He was anxious to know if specific forms were associated with particular chemical products, and if those products were the direct result of bacterial activity or a secondary consequence of that activity. He spoke of the intimate relationship that exists between the studies of bacteriology, chemistry and physiology, reference being made to the work of Klein and Pasteur, and after dwelling upon the necessity for the full discussion of the question of vaccination (which was related to the subject of the paper), amongst the educated portion of the community, he concluded by arguing that Pasteur's statements as to the persistence of germs for years in the decaying bodies of animals was an overwhelming argument in favour of cremation.

Mr. Strother gave a humorous instance of the popular idea upon the subject of microbes, and referred to the necessity for a system of classification as facilitating the study of the subject. He had anticipated that Mr. Davis in presenting a subject of this character would have dwelt a little more fully upon the sanitary and germicidal side of the question, as these were matters of practical importance to pharmacists.

Mr. F. C. J. Bird discussed the numerous terms that were commonly used in speaking of these micro-organisms, and suggested that "bacterial" was a good general term to employ. He also alluded to the difficulty that was encountered in freeing solutions from bacteria by simply boiling. He would have liked some information respecting the lenses that were suitable for bacteriological work and yet were within the means of students.

Mr. Ince then asked if he might be allowed to read the following note, which was especially interesting from a historical point of view.

Marcus Terentius Varro on Bacteria.

Some few months ago (in March) I was requested by Mr. Stanley J. Smith, of Colchester, to search for and verify a passage from a Latin author bearing on bacteria. It had been stated in a public lecture that these minute organisms had not only been alluded to but described so early as before the birth of Christ.

The statement needed confirmation, and I found the passage in a treatise by Marcus Terentius Varro, 'De Re Rusticâ,' on country life. Varro lived about B.C. 114, which was the age of Cicero.

In one of his chapters he gives directions for the choice and building of a villa; for the opening sentences I borrow Owen's translation, date, 1800.

"You must endeavour to place your villa at the bottom of a mountain that is woody, where there may be extensive pastures, with the front towards the winds which are most salubrious.

"That, which is placed towards the rising of the sun at the equinox, is very convenient, for it has some shade in the summer, and it has some benefit from the sun in winter.

"If you should be compelled to build near a river you must take care that you do not place your villa in such a situation as may be immoderately cold in winter, and unhealthy in the summer."

Now comes the sentence to which I would draw attention. The text as reprinted in 1472 reads thus :—

Quo sit loco potissimum villa statuenda.

Advertendum etiam si quum erunt loca palustria et propter easdem causas et quum arescunt, crescuntque animalia quædam minuta, quæ non possunt oculi consequi, et per aera intus in corpus per os ac nares perveniunt atque efficiunt difficiles morbos.

Here I must leave Owen, for his translation does not follow the original with sufficient closeness.

The passage may be thus rendered:—"Attention must be also paid as to whether there are marshy places, both for the same reasons, and because when they become dry, certain minute animals breed, which the eye cannot discern, and which borne through the air, penetrate into and within the body, by the mouth and nostrils, and propagate obstinate diseases."

Turning once more to Owen, the author, as was his habit, further explains the matter in a conversation. Fundanius, is the man of property; Agrius, the farmer; Scrofa, an imaginary character who comes in upon occasions.

Fundanius says, "What shall I do, if a farm of this kind falls to me by inheritance, that contagion may not affect me?"

"I can give an answer to that question," says Agrius: "Sell it for as much money as you can; or if you cannot, leave it."

But Scrofa says, "You must take care that your villa may not front those parts from which unwholesome winds usually blow, and do not build it in a hollow valley, but in an elevated situation, that if any unhealthy air is blown there it may be the more easily dispelled. Besides a situation on which the sun shines all day is more salubrious, for if any animalcules breed and are brought there, they are either blown away or they soon perish from drought."

Often in the laborious treatises of mediæval writers we trace foreshadowings of great truths which are accepted in our own day; but Varro, before the Christian era, speaks of what we term a modern discovery in no uncertain manner.

Our age is distinct as it exhibits the march of exactness as against speculation and poetic fancy. Whether the time may come, as we hope it will, when our knowledge may attain a precision by the aid of which we may combat disease face to face, I know not; but this I know, for it is certain, that investigations similar to those brought before us to-night tend in that direction.

Mr. Fawssett referred to the mention made in the paper of the practice adopted by agriculturists in using copper sulphate as a "pickle" for wheat, and inquired if its germicidal properties were based upon a satisfactory foundation.

Mr. Blackham said he had paid some attention to the subject, and had always considered that the liberal use of water was inimical to the growth and increase of microbes, an opinion that was confirmed upon hygienic grounds; he was therefore unable to see how water could act as a preservative of bacteria. He was in favour of cremation. He thought that the relatively high position of corrosive sublimate amongst antiseptics was not altogether in accordance with facts, nor did permanganate of potassium possess disinfectant properties to anything like the degree that was commonly claimed for it.

Mr. A. C. Stark thought the Association was indebted to Mr. Davis for the interesting manner in which he had treated a most important subject. It was an interesting subject, as showing the rapid progress that science made now. When they considered that within the life of the youngest man present, little or nothing was definitely known of these organisms, and the relative amount known of them now, it seemed to promise most valuable discoveries in the future. It was gratifying to note that some of the best work upon the subject had been done by a man who was then but an amateur in science and who had moreover so ably refuted Bastian's theory of spontaneous generation. He referred of course to Dallinger. The spontaneous generation of life was to a scientific man an absurdity. It would be quite as reasonable to talk of the spontaneous generation of matter or of force. With regard to the action of bacteria in the origin of diseases, he believed that the foremost investigators were inclined to think that it was the ptomaines the bacteria produced which really were the immediate cause of many diseases; the recent investigations of Dr. Luff and others seemed to confirm this view. He was sorry Mr. Davis had not said more about antiseptics, which was certainly the side of the question most valuable to pharmacists. The ideal antiseptic was yet, he thought, to be discovered. Perchloride of mercury, although still the most powerful known, was by no means entirely satisfactory. It ruined the instruments, and was, owing to its poisonous nature, rather unsafe in many cases. He thought that pharmacists might do good work in the direction of finding an efficient and non-poisonous antiseptic. In this connection it was interesting to note that one of the most successful and skilful operators of the present day entirely repudiated the use of antiseptics in surgery, and declares them to be not only useless, but positively injurious. Evidently, then, Listesium was not the last word upon the subject. Turning now to the question of the value of inoculation, there was one thing that vaccination had effected which the most rigorous opponent of it could hardly deny. It had mitigated the character of the disease. The percentage of death in the cases of smallpox had fallen enormously since the introduction of vaccination, and it was difficult to explain this by the improvement in sanitation.

Mr. E. Richards testified as to the value of boric acid as an antiseptic agent.

Mr. W. L. Williams said he much feared his rendering of the paper had not done its author justice; he had only that morning been made aware that it might fall to him to read the paper, and he had not been able to peruse it before delivery; they would probably appreciate the difficulty under which he

laboured. He confessed that he had experienced a slight feeling of disappointment, for he had expected that the author would have treated the subject, which was one of very great interest, in a broader manner. No allusion had been made to the odours and colours which accompanied and were evidence of the presence of bacteria, nor to the useful economic products which were associated with their development. The question of classification had occupied much attention, and the names of Cohn and Lankester were inseparably associated with the subject. Lankester's proposal was to include them all in one class, on account of the identity in colouring pigment which ran through the entire series. Here, as elsewhere, much depended upon the limitation that was assigned to the term "species." There was undisputed evidence of the existence of intermediate forms of bacteria, as might be seen in the case of acetic fermentation. Here one organism was required to convert sugar into alcohol, before the *Bacillus aceti* could commence operations. The difficulty of freeing water from bacteria by boiling was not due so much to the tenacity of life in the organisms themselves, though that was often considerable; it was rather due to the failure to destroy the spores which embedded themselves in a gelatinous mass, known as zooglea, for their destruction by boiling whilst in that stage was well known to be a highly difficult matter. Sterilization might be effected by heating in a hot-air chamber to a temperature above the boiling point of water, for a period of one hour upon three successive days. Milk had been reported to be a fruitful carrier of disease, and it was always advisable to use only boiled milk for dietetic purposes. The last word had still to be said upon the subject of antiseptics, and investigations were still being carried on. He thought there was no question as to the germicidal property of copper sulphate. It was a very old-fashioned remedy in certain surgical cases. He could not say much with regard to an efficient and cheap lens, but he knew of an $\frac{1}{8}$th with a good eye-piece, sufficing to detect the bacillus of tuberculosis.

The proceedings terminated with a vote of thanks to Mr. Davis for his paper, and to Mr. Williams for replying.

Provincial Transactions.

LEEDS CHEMISTS' ASSOCIATION.

The twenty-first annual meeting of the above Association was held October 4, the President, Mr. William Smeeton, in the chair.

The annual report and financial statement, showing an increase in the number of members and a slight excess of receipts over expenses on the year, were approved and adopted.

A statement of accounts for the five years during which lectures for associates have been maintained was read, and it was resolved to meet the small deficit by means of donations. It was also decided that a meeting of a social nature be arranged during the present session.

A resolution constituting the members of the Association a committee to make the necessary local arrangements on the occasion of the visit of the British Pharmaceutical Conference was, on the proposal of the Hon. Secretary, seconded by George Ward, adopted.

The following were unanimously elected, on the proposal of G. W. Worfolk, seconded by J. W. Shepherd:—President, W. Smeeton; Vice-President, Geo. Ward; Hon. Treasurer, Jas. Hirst; Hon. Secretary, F. W. Branson; Council, J. H. Beacock, P. Jefferson, W. D. Pollitt, R. Reynolds, S. Taylor, E. Yewdall.

At the next meeting of the Association the following will be communicated:—"Physical Operations of a Chemical Laboratory," by Dr. Lewkowitch, Ph.D.; and "Various Methods of Estimation of Urea," by F. W. Branson.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of the Session was held on Thursday evening, October 24, in the Association's rooms, 74, Commercial Street. Mr. John Forsyth, President, occupied the chair, and there was a good attendance, including several local chemists.

The minutes of the previous meeting having been read and confirmed, the Chairman called on Mr. T. C. Henderson (the secretary) to read his paper entitled, "Notes on a few Medicinal Syrups."

Mr. Henderson at the outset said it was simply his intention to give a short sketch of his experience in the manufacture and preservation of a few of the more important of these syrups. Beginning with syr. ferri iod. and quoting the B.P. 1867 formula, he said that shortly after this syrup was made it assumed a brownish coloration, due it was said by many to the oxidation of the ferrous salt into the ferric, with liberation of free iodine, although this opinion was by no means universal. Various methods were suggested to prevent this coloration, including the alteration proposed in the B.P. 1885. After enumerating these methods the writer said that as the result of his experience he would advocate the use of 0·1 per cent. hypophosphorous acid or 5 per cent. of glycerine, preferably the latter.

Here he showed several samples, all made at the same time, and with the same sugar, and preserved by various methods. Of these it was seen that syrups preserved according to either of those methods mentioned possessed a far more elegant appearance than the others.

Coming next to syr. ferri bromidi he found that Martindale's formula, with the addition of either acid. hypophosph. or glycerine, made a very satisfactory syrup.

Coming to Easton's syrup the essayist said that the preservation of this had been a source of trouble to many. He himself had followed the formula published in the 'Extra Pharmacopœia,' 1st edition, for some years. Soon after this was made it turned opalescent, and eventually a white precipitate settled at the bottom of the bottle. As a remedy for this he reduced the quantity of quinine by one-fourth, and this answered very well. After standing for some time this syrup assumes a dark coloration, but by adding 5 p. c. of glycerine this coloration is retarded, and samples were shown which were made four months ago, one with and the other without glycerine, and the results were very different; the glycerine sample being quite bright and clear, while the other was dark in appearance.

Following on this was a few remarks on syr. phosph. co., and then syr. hypophosph. co. Speaking of this syrup Mr. Henderson said that during his residence in the Royal Infirmary he had had occasion to make large quantities of this syrup, and as the result of his experience he laid before them the following formulæ, which he said gave the utmost satisfaction to all the staff of that Institution.

Take of—

Strychnine	1 grain.
Quinine (pure)	40 grains.
Manganese hypophosphite	40 grains.
Hypophosphorous acid	℥ii.
Water	℥i.

Dissolve and filter.

Sodium hypophosphite	160 grains.
Calcium hypophosphite	160 grains.
Liq. ferri hypophosph. B.P.C.	℥iii.

Dissolve and filter.

Mix these two solutions and add—

Glycerine	℥iv.
Syrup (cold) suffict. to produce .	℥xx.

Each drachm will thus contain about $\frac{1}{100}$ grain of strychnine, $\frac{1}{4}$ grain quinine, $\frac{1}{4}$ grain manganese, $\frac{3}{4}$ grain iron, 1 grain calcium, 1 grain sodium hypophosphite.

After referring briefly to syr. tolu, syr. scillæ, etc., Mr. Henderson concluded by recommending his hearers to be careful as to what kind of sugar was used, as many of the changes which occurred in these syrups, also the unsatisfactory results which were often obtained, were not always due to faulty manipulation but to the impurities contained in the sugar of commerce, and he recommended the more frequent use of glycerine in these preparations.

On the conclusion of the paper, which all through was most attentively listened to, the essayist was awarded a very hearty vote of thanks, after which some discussion took place in which Messrs. Campbell, Doig, Forsyth, Lamont, Lindsay, and others joined.

A vote of thanks to the Chairman concluded the meeting.

The next meeting of the Association will take place on Thursday, November 7, when the question "Ought the Curriculum Bill to become Law?" will be discussed, the openers being:—Aff., Wm. G. Lamont; Neg., D. McD. Skinner.

British Pharmaceutical Conference.

MEETING OF THE EXECUTIVE COMMITTEE.

A meeting of the Executive Committee was held at 17, Bloomsbury Square, on Wednesday, September 23, 1889, at 4.30 p.m. Present: Mr. Umney (President) in the chair, Professor Attfield, Messrs. Carteighe, Davies, Ransom, and Mr. Martindale (Hon. Treasurer), Mr. Naylor (Hon. Gen. Sec.) and Mr. J. C. Nightingale (Ass. Sec.).

The minutes of the previous meeting were read and confirmed.

Intimations of inability to attend were announced as having been received from Professor Bentley, Messrs. Atkins, Dott, Groves, Kinninmont, Kirkby and Reynolds.

Mr. Naylor (Hon. Gen. Sec.) read a letter which he had received from Dr. Thresh, tendering his resignation as Senior Honorary General Secretary of the British Pharmaceutical Conference.

The following resolution was proposed by Professor Attfield: "That the Executive Committee regrets that Dr. Thresh has, in consequence of his appointment as Medical Officer of Health to Mid and East Essex, found it necessary to resign his office as the Honorary General Secretary of the British Pharmaceutical Conference. The Committee on behalf of the Conference desires to place on record its sense of the valuable services rendered to the Conference by Dr. Thresh during the past five years." This was seconded by Mr. Carteighe and carried unanimously.

It was agreed to defer to the next meeting of the Committee the election of successor to the vacant office of Honorary Secretary.

A letter addressed to Mr. Naylor from Mr. J. Maltby Clague of Newcastle was then read, pointing out that the Library of the North of England Pharmaceutical Association required the 1886 'Year-Book of Pharmacy' to complete its set, and intimating that the Association would be grateful to the Executive of the Conference if it would supply the needed volume. The request was cordially granted.

The Committee of the Unofficial Formulary through its chairman asked leave and obtained the necessary sanction to publish a short list of formulæ at an early date.

By unanimous vote the remuneration of the Assistant Secretary was increased by £10 per annum.

Ten gentlemen were elected to membership.

The thanks of the Committee were accorded for the Twenty-fifth Annual Report of the Alumni Association, 1888-9.

MEETING AT NEWCASTLE-UPON-TYNE.

Wednesday, September 11.

(*Continued from page* 338.)

The next paper read was entitled—

Tannin: Its Solubilities, etc.

BY B. S. PROCTOR, F.I.C.

While compiling a table of solubilities of pharmaceutical materials for the second edition of 'Practical Pharmacy,' I found that the statements with regard to tannin were very contradictory, old writers saying that in the manufacture of tannin by treating powdered galls with moist ether, a heavy aqueous solution of tannin was obtained, and a lighter ethereal liquor containing but little tannin, tannin being only sparingly soluble in ether. More recent and careful observers state that the heavy liquor is a dense solution of tannin in ether, tannin being very soluble in ether. I accepted this latter testimony, and obtained what I considered confirmatory evidence. This was in 1882. On the appearance of the B.P., 1885, I noted its statement that tannin is sparingly soluble in ether.

When the lecture session of the present Newcastle Pharmaceutical Association collapsed for want of students I felt my hand liberated, and took up the criticism of the pharmacopœial tests, and I now propose to lay before you notes of my observations on tannin, observations made in a somewhat fragmentary way during the last two or three years, and made with the appliances and methods most handy to a pharmaceutical operator. I do not give them in exact chronological order, but arranged according to the nature of the experiments.

I first worked, as most pharmacists would, with commercial tannin and methylated ether. Then I went to commercial tannin and commercial absolute ether. Becoming more critical I estimated the water in my tannin, and worked with dry tannin and commercial absolute ether, and as a last step I adopted ether, which I had rectified by maceration with, and distillation from, sodium.

Note A. To 6 fluid drachms of ether (=about 235 grains) tannin was added 20 grains at a time up to 180 grains. The first addition soon dissolved excepting a very small light residue. The second did the same; the third dissolved, but the solution separated into two strata, one heavy and turbid, the other light, clear and pale. Further additions continued to dissolve, the lower stratum increasing and the upper diminishing in bulk till the sixth addition (total 120 grains) caused the total disappearance of the light stratum, but did not exhaust the solvent power. Three further additions were made without showing saturation. This was 180 grains of tannin in 235 grains of ether.

The insoluble was evidently very small and light; it was filtered out, washed with ether, then with spirit, and finally with water, and when dry weighed 0·3 grain.

B. The filtered solution "A" was found to dissolve in all proportions in methylated ether, though the same proportions of ether and tannin had previously given immiscible strata. This observation is not confirmed, nor yet exactly contradicted by subsequent results, as the experiments have not been precisely parallel.

C. Further additions of tannin in powder to the solution "B" at first dissolved clear, but 20 per cent. addition caused the re-establishment of immiscible strata, one volume of light solution rising and two volumes of heavy subsiding.

D. The light solution containing about 8 per cent. of tannin, the heavy about 25 per cent. of tannin.

F. The ethereal solution of tannin "B," containing about 43 per cent. of tannin when shaken with an equal volume of water, separated into three strata. The bottom one, "Fb," thick and brown; the middle, "Fc," almost colourless, and the top one, "Fd," small, yellow and mobile. The heaviest solution was ethereal, and contained about 33 per cent. of tannin. The lightest solution was also ethereal, and contained about 2·2 per cent. of tannin. The middle stratum was aqueous, and contained about 3 per cent. of tannin. We may no doubt regard all these three solutions as consisting of ether, water and tannin, the proportions being determined by some law not as yet ascertained.

We should naturally conclude that both of the ethereal solutions would contain as much water as they could take up, and that the aqueous solution would be saturated with ether; but it would not be safe to assume that the same law of intersolubility which holds good between ether and water in their pure state would be maintained in the presence of tannin.

The solutions "Fb" and "Fc" (heavy ethereal and aqueous) left in an uncorked vial at rest for twenty-four hours remained as separate strata, but on shaking became a clear uniform solution. The addition of a little ether caused separation into *two* strata, a syrupy heavy ethereal solution with a weak aqueous solution above, and a further addition of ether caused separation into *three* strata, the heavy and light liquors as before being ethereal, and the medium aqueous.

G. A fluid drachm of commercial absolute ether (sp. gr. 0·7194) with additions of tannin, 5 grains at a time. The first addition turned pasty and then dissolved, forming heavy and light solutions. Further additions were made 5 grains at a time up to 40 grains, the light stratum disappeared, a dense solution nearly clear resulting (38·8 grains of ether to 40 grains tannin); that is to say, this syrupy solution contained more than 50 per cent. of tannin.

H. 1 drachm of tannin pressed into a half ounce vial and f℥j. commercial absolute ether poured upon it, the tannin speedily contracted and dissolved into a syrupy liquid. That is tannin 60, ether 38·8 or nearly 60 per cent. of tannin in the solution.

I. Pharmaceutical tannin, as dry as dust, was found to lose about 10 per cent. on drying at water-bath temperature. I am not in a position to say whether or not a few hours' exposure to this temperature effects any decomposition, but for the present paper I speak of this simply as dry tannin.

J. 6·4 grains of dried tannin with 20 grains of commercial absolute ether speedily became pasty, and in twelve hours formed a syrupy liquid with a supernatant mobile stratum. Four grains of dry tannin added dissolved speedily, solution being nearly complete in five minutes. Further additions of tannin up to a total of 18·4 grains dissolved to a thick syrupy liquid.

Having named these results to Prof. Bedson, he suggested repeating the experiments with ether further rectified, considering that the sp.gr. 0·7194 was not a sufficient guarantee of purity. I consequently rectified a small quantity of ether for myself, taking commercial ether from pure alcohol, macerating it with fused potash for several days, decanting the ether from the heavy alkaline liquor, and adding to it eight or ten little strips of sodium, moderating the action by immersing the bottle in cold water. When the action had apparently ceased the ether was again decanted clear and brown. Clean sodium was added and the maceration continued for ten days, during which there was no visible evolution of gas, though some further action on the sodium took place. At the end of this time the bottle was connected by a bent glass tube and perforated corks with another clean dry bottle

The bottle containing the sodium and ether was then immersed in warm water and the other bottle in ice and water. Distillation was continued till nine-tenths of the ether had passed over. A sample of this ether, after keeping in a corked vial for a week, was tested again with a strip of sodium. A very small evolution of gas took place, but no discoloration of the ether. This I expect indicates that all the alcohol had been removed by the first treatment, and probably that the ether had absorbed a trace of water by the bottle having been opened from time to time for use. The ether rectified from sodium was taken for the next experiment, for which I also prepared some dry tannin by heating to about 200° F. till its weight was constant.

K. Two fluid drachms of dry ether with 10 grains of dry tannin. The tannin took the appearance of a damp powder in the course of an hour. In two hours it was pasty. In twenty-four hours it was a syrupy liquid at the bottom of the bottle with a stratum of thin ethereal solution above. Further additions of dry tannin, 10 grains at a time, were made, each one undergoing solution more speedily than its predecessor up to the fifth addition. Two more additions, making a total of 70 grains of tannin to 77·6 of ether, made a thick turbid liquid which became more fluid at about the temperature of boiling ether, but turning thick again on cooling, almost approaching a gelatinous condition, too thick to pass through filter paper, and on the addition of a little dry ether it was thinned but not sufficiently to filter, and part of the solution separated again as a light mobile stratum. Thirty grains of dry tannin crushed into a small bottle, and f℥j of dry ether poured upon it caused it to contract speedily, become pasty in the course of an hour, and fluid in the course of a day, some small particles remaining undissolved in the thick liquid, while a clear stratum remained above. The latter (the clear stratum) decanted weighed 11·7, and on evaporation left 0·3 of tannin, or about 2·56 per cent. The syrupy portion weighed 56·5, and left 29·8 of tannin, or 50·9 per cent.

These experiments are suggestive of there being an important influence exercised by the water present in the tannin under ordinary keeping and the water and spirit contained in commercial ether.

The behaviour of ether and tannin may be compared to that of ether and water, the analogy being more conspicuous if we take water in a physical condition analogous to the tannin, that is solid water—snow. Add a little to ether and it makes a light ethereal solution. Add a little more and it makes a heavy solution, sinking to the bottom, and a light one. Both of these are solutions of snow and ether. Add more snow and a point will be reached at which the light stratum will disappear, the whole of the ether being saturated with snow, or as we are more apt to express it—water enough has been added to dissolve all the ether. In operating at ordinary temperatures we are apt to lose sight of there being a saturation of the ether in the heavier liquor, because this solution is miscible in all proportions with water, as in like manner the lighter ethereal solution of snow (or water) is miscible in all proportions with ether. We are apt to speak of the phenomenon of solution as if the solvent only were the active body. But if solution is a composition of the molecular motions of the bodies concerned we must take into account the molecular motions of the solids, as well as of the liquid solvents, and if we admit the statement that tannin is sparingly soluble in ether we should guard the statement by adding that ether is largely soluble in tannin.

The length of time during which a small quantity of dry tannin many remain apparently dry and dusty in ether is remarkable, and suggestive of combination taking place between the tannin and ether, analogous to the combination which takes place between some anhydrous salts and water before solution can be

effected. For example, dry ferric sulphate thrown into cold water only slowly dissolves, though it is really very soluble and very deliquescent. Its hydration takes considerable time, the solution of the hydrate takes very little. The heavy ethereal liquor may be an etherate of tannin in the same sense as an anhydrous salt may combine with a portion of water and become a crystalline hydrate, and then with a large bulk of water it becomes a solution.

If we accept this proposition, then the "etheration" of the tannin is obscured by the fluidity of the compound, and by our want of a clear definition of what constitutes solution.

The experiment *F* recorded above, in which ethereal solution of tannin shaken with water separated into three strata, the heavy ethereal liquor containing 33 per cent. of tannin against 3 per cent. in the aqueous, suggests that tannin is more soluble in ether than in water. Or to use a rather old-fashioned form of expression, that there is a greater affinity between ether and tannin than between water and tannin. I prefer that old-fashioned statement as being more concordant with the facts, for the solubility in water is even greater than its solubility in ether.

N. To a fluid drachm of water tannin added 60 grains at a time up to 180 grains; the last addition made it pasty while cold, but fluid while warm. Increasing the water to fʒiss. (*i. e.*, 71 grains), it became a brown syrupy liquid while cold. Stated in 100 parts we may say 100 of cold water dissolve 253 parts of tannin, forming a syrupy solution. Being a colloid body, there is no hard and fast line of delimitation to its solubility.

O. Sixty grains of tannin in fʒj. rectified spirit dissolves rapidly. The same result was obtained with B.P. absolute alcohol.

P. Two grains of tannin in fʒj. chloroform, macerated for a day, showed no sign of solution. Thrown on a filter, 44·2 grains of the filtrate left on evaporation a residue too small to be weighed, but capable of giving a colour reaction with ferric chloride equal to that produced by about two or three tenthousandths of a grain of tannin.

Q. Two grains of tannin in fʒj. benzol macerated a day and filtered; 22·5 grains of the filtrate evaporated left a residue too small to be weighed, and giving a scarcely visible colour reaction with ferric chloride. The possibility of using separable solvents in the estimation of tannin in solutions seemed to be indicated by the experiment *F*, and the following gives the results of some tentative trials.

R. Sixty grains of tannin dissolved in fʒv. of water in a separator, fʒj. methylated ether added dissolved. The addition of ½ drachm more ether caused the separation of about 65 grains of a heavy ethereal solution, which on evaporation left 28·7 grains of tannin.

b. fʒiss. more ether added to the contents of the separator (which was a clear brown solution) made it milky, and caused the deposit of a further portion of heavy ethereal solution, which ran off to the extent of 35·4 grains, containing 14·8 of tannin.

These estimates of the weight of the ethereal solutions run off are necessarily very crude, as the evaporation of ether was going on all the time of the running and weighing, but this is not of consequence, as the important point—the quantity of tannin they contained—was determined with comparative accuracy.

c. A third separation of heavy solution took place on adding fʒiss. more ether, but the quantity was small, only five or six drops, and left a residue of 0·8 of tannin. The contents of the separator at this stage were clear while cold, but the warmth of the hand made them milky, the clearness being restored by running cold water over the outside of the vessel.

d. A final addition of fʒiss. ether caused the separation of a light ethereal solution containing 1·5 tannin.

e. The aqueous solution was found still to contain 6·2. The tannin used in this experiment had not been dried, and according to the observation recorded in note *I* it might contain 10 per cent. of water, and on this supposition there was about 2 grains loss in the experiment. The point, however, is that the ether did not remove all the tannin from the water, but nearly ceased to do so when there ceased to be so much present as would make a heavy solution with the ether.

The presence of common salt diminishes the power of water to dissolve ether: and the addition of brine to a syrupy aqueous solution of tannin precipitates the tannin almost entirely. The question naturally presents itself whether the addition of salt to the contents of the separator would make the extraction by ether perfect or nearly so.

Two subsequent experiments with the object of testing this were inconclusive through accidental circumstances. In the first the tannin had not been dried previous to the first weighing of the 60 grains taken for experiment, so the tannin obtained by shaking out was air-dried only and weighed 57·1. The difference in the degree of dryness it might have detracts from the value of the result. In the other case the vessel was broken before the final weighing had been obtained.

In note *I* I recorded the fact that pharmaceutical tannin under ordinary keeping contained so much water as to lose about 10 per cent. on drying in a water-bath.

S. Repeating the experiment again, 10 grains of tannin from the shop stock, exposed to the air in an evaporating dish for twenty-four hours during rather damp weather, gained 0·5 grain.

Heated over a water-bath at about 200° F. (the water not being kept boiling) lost 1·5, making a difference of 15 per cent. between the two conditions, both having the appearance of dryness. In its dry state tannin rapidly absorbs moisture. We may say it is pretty strongly hygroscopic but not deliquescent. Its hygroscopic quality is apt to be overlooked, from the fact that the moisture which it absorbs under ordinary circumstances makes no visible change in its condition.

T.—With the view of testing the disposition of tannin to absorb ether vapour, 10 grains of dry tannin placed in a miniature percolator made of a leech tube, the narrow end of which was tied over with muslin and set in a ½-ounce vial containing fʒj. of dry ether, the top of the tube being corked to prevent very rapid evaporation of the ether, the bottom of the tube standing about half an inch above the surface of the ether in the receiver. The tannin absorbed 6 grains of ether vapour in sixteen hours, and in twenty-four hours had absorbed 9·1 grains, being converted into a pasty mass sufficiently soft for a little to ooze through the muslin. If we had habitually to work in an atmosphere impregnated with ether vapour, as we have to do with one containing water vapour, we should probably say that tannin was not only "etheroscopic," but deliquescent.

U. A similar experiment with absolute alcohol instead of ether showed a similar result taking place more slowly, the vapour evidently penetrating only slowly into the column of dry tannin. In eight hours 0·5 had been absorbed; in forty-eight hours the increase in weight amounted to 2·2, the bottom of the tannin having become pasty. The dry portion was removed, and weighed 7 grains; thus it was 3 grains of tannin which had absorbed 2·2 of alcohol vapour. The tube being returned to its place, the absorption of vapour continued, converting the pasty portion into fluid, which passed through the muslin into the spirit in the bottle below.

Comparing the results of the last two experiments with the experiment on the absorption of water by exposure to the air in damp weather, as recorded in note

S, we might suppose the affinity of tannin for water vapour was much less than its affinity for ether or alcohol vapours, but that is probably a question of temperature and the percentage of vapour contained in the atmosphere in which the tannin is placed. To test this supposition the same apparatus was used with water, as follows:—

V.—The tannin taken was that which had been ascertained to contain 10 per cent. of water. 1·1 gr. of this in the tube, placed over cold water, increased 0·1 grain in the course of thirteen or fourteen hours. The percentage of water now contained in the tannin would be 20 per cent. The whole arrangement was then placed in a beaker set in hot water for two or three hours. This of course increased the per cent. of water vapour in the atmosphere permeating the tannin, and greatly increased the speed of absorption, the tannin becoming pasty and containing at this stage 0·5 of water, or 50 per cent. of the weight of the dry tannin.

From the mode of its production, pharmaceutical tannin is not likely to contain any notable impurities, and such as it may contain are likely to be detected by want of perfect solubility in water, in spirit and in moist ether, or its solubility in dry ether being far from perfect, but as a further confirmation of its purity I have devised the following test, dependent upon its perfect precipitation by ferric hydrate.

W. Twenty grains of tannin and 20 of dry ferric sulphate, each dissolved in ½ ounce of warm distilled water, and mixed, Partial precipitation of both reagents will take place, but if now 40 grains of precipitated barium carbonate be added, the complete precipitation of all these chemicals will take place, and on heating the mixture to the boiling point to expel carbonic acid and facilitate the speedy completion of the reaction, and throwing the magma upon a filter, pure water will come through. This, on evaporation, would indicate if there had been present any substance such as glucose, not precipitable by these reagents.

I have said *dry* ferric sulphate, as the pharmaceutical solution of this salt usually contains nitric acid, which would introduce nitrate of barium into the filtrate. The barium carbonate, if not well washed, is also a source of error.

X. I have obtained results equally good by substituting prepared chalk for the carbonate of barium, provided spirit and water in equally proportions were used for the solvent, dissolving the tannin in methylated spirit, the ferric sulphate in warm water, and then adding the chalk.

Looking over all these results there are sundry questions which I feel tempted to ask, but which I have not yet seen my way to answer.

Is the tannin retained by the water in experiment *F* of the same nature as that in the heavy or light ethereal solutions?

Is the portion insoluble in dry ether, but soluble in moist, the same nature as that which is soluble in dry ether? We might very naturally say no; there must be two or more bodies in commercial tannin. That, however, is not absolutely conclusive.

Is pharmaceutical tannin a glucoside of digallic acid? This has been debated, but it is rather a speculation of pure chemistry than a question of practical pharmacy.

Is tannin changed by drying at 212° till it ceases to lose weight? One experiment seemed to indicate that it partially lost solubility, but that I have not conclusively answered. It is, however, a pharmaceutical problem, and we may inquire whether the B.P. instruction to "dry the tannin in a hot air chamber at a heat not exceeding 212° F." is a suitable limitation.

I have used the term "tannin" and "pharmaceutical tannin" rather than tannic acid, as the writers on this subject differ in their statements, and speak of "natural tannic acid," "crystallized tannic acid," "tannic acid freed from glucose," etc., and I wish it understood that my remarks apply to a product supposed to be obtained by the official process.

The solubilities of tannin as above noted put into tabular form are as follows:—

Tannin and ether forming a syrupy solution.

One hundred parts of meth. ether dissolve 51 to 76 or more of tannin in its commercial state (note *A*).

One hundred parts of com. absol. ether dissolve 102 of tannin in its commercial state (note *G*).

One hundred parts of com. absol. ether dissolve 92 of dried tannin (note *J*).

One hundred parts of ether rectified by sodium dissolve 90 of dry tannin (note *K*).

Tannin and ether forming a mobile solution.

One hundred parts meth. ether dissolve about 9 of tannin in its commercial state (note *D*).

One hundred parts of ether dissolve 2·3 of tannin in the presence of water (note *F*).

One hundred parts of ether rectified by sodium dissolved 2·5 of dried tannin.

Tannin and other solvents.

One hundred parts of cold water form a syrupy solution with 253 parts of tannin.

One hundred parts hot water form a syrupy solution with 300 parts of tannin.

One hundred parts of rectified spirit or absolute alcohol dissolve 120 parts or more of tannin.

One hundred parts of chloroform dissolve about 0·007 parts of tannin.

One hundred parts of benzol dissolve less than 0·007.

Brine dissolves only traces of tannin. The quantity not estimated.

Mr. DOTT said he was not sure that he altogether agreed with Mr. Proctor in the conclusions he had arrived at. Commercial ether contained not only water, but alcohol also, even that of 0·717 specific gravity. Of course tannin being soluble in alcohol, unless it were eliminated entirely the solvent could not be relied on as being ether, for it might be partly alcohol. Commercial tannin was not a definite chemical compound, but a mixture of some kind, and any definite statement as to a substance like tannin being soluble one part in so many could hardly be made. It was soluble practically to any extent in a menstruum in which it was soluble. Given a sufficient time, there was no limit between solidity and a weak solution. It was only as regarded crystalline substances that definite statements could be made as to solubility, and not as to an amorphous substance like tannin. Another point was that sodium was not a good agent for dehydrating ether; it did not completely remove the water from any substance to which it was applied, at least not when alcohol was present.

Mr. MABEN asked if Mr. Proctor had any theory to account for the two ethereal layers.

Mr. PROCTOR said Mr. Dott would not have made the remarks he had if he had read the paper in its entirety, because he had pointed out clearly that the tannin of commerce was not to be regarded as a definite thing. He spoke of tannin rather than tannic acid, because authorities differed as to what tannic acid was. With regard to the dehydration of ether by sodium, he could only say that his authority was the Professor of Chemistry at Newcastle, who recommended that process to get rid of the least trace of water as being the most reliable he could suggest. Mr. Dott shook his head, but he should be glad to hear if he could suggest any better method than digesting it ten days with metallic sodium and then distilling from the same.

Mr. DOTT said it could be found in other cases that

hydrate of sodium gave up a certain amount of water, which was always re-formed.

Mr. PROCTOR said he would not argue the question if there were experimental evidence to show that he was wrong, but he should like to have the matter proved by experiment. In the absence of any better evidence than Mr. Dott was able to give at present with regard to the separation of water and alcohol he said metallic sodium was a very good medium for separating alcohol. The alcohol itself was decomposed by sodium, and the maceration of the rectified ether again with sodium, and redistilling it did not, he think, allow much probability of there being an imperfect rectification. If there was he should be glad to hear of the experiment which proved it. In the meantime he accepted the statement, as given to him on what he considered good authority, that that was a good means of separating the ether from the alcohol and water which were invariably present in the commercial articles. Again Mr. Dott stated that the solubility of an article of a colloid nature like tannin could not be definite, and that was a point he had not overlooked, but there it was from one degree up to an infinite degree. That he pointed to as regards water, but what about the light ethereal solution being a separate thing which did not mix with a heavy one. There there was a definite point of solubility of ether in tannin, a point it fixed for itself. With regard to Mr. Maben's question, if he had a theory about the two solutions, his theory was that it consisted of a composition of the forces of the two bodies, the solvent and the body dissolved; that in the light ethereal solution the probability was that the molecular movement in the ether raised the tannin up to its own velocity, and that in the heavy ethereal solution the tannin degraded the molecular mobility of the ether to its own degree or something like it. He regarded the two solutions as compositions of molecular motion and determining one another, and they were totally distinct. To get over the difficulty which might be experienced in some minds in saying that there could be these two separate solutions with two separate properties, he put it the other way and said that in the one case the ether dissolved the tannin and in the other the tannin dissolved the ether. If they accepted that it got over the theoretical difficulty of the two separate solutions, both consisting of ether and tannin, which at the same time were totally immiscible. This matter had grown in interest to him considerably in working it out, and if any further light came to him on the matter he should be happy to make it public at some future date.

The next paper was on—

WILD CHERRY BARK AND ITS PREPARATIONS.

BY L. W. HAWKINS, F.C.S.

The bark of the wild cherry, *Prunus serotina*, possesses sedative and mildly tonic properties. Although its value as a tonic is due to the indefinite substance, prunin, there is little doubt that its introduction into medicine was brought about by the hydrocyanic acid it yields on the addition of water. Bentley and Trimen say "The best time for collecting wild cherry bark is the autumn, as it then yields most hydrocyanic acid, to which its properties are more especially due." And again, "The sedative action which the bark exerts on the heart depends essentially upon the hydrocyanic acid it yields." This being the case it is obvious that if the drug is to obtain full justice to its medicinal properties its preparations should be so made as to represent as nearly as possible the whole of the hydrocyanic acid obtainable from the bark, and that this quantity should be fairly uniform.

The amount yielded by the fresh bark varies with the time of the year, the percentage being according to Perot about ·05 in April, ·1 in June, and ·14 in October. As, however, the bark is ordered to be used in the dried state, these figures cannot be taken as a standard for the strength of the preparations.

The bark should be collected in autumn, and as it deteriorates by keeping should be recently dried. The autumn is therefore the most favourable time for using it. Whether or not the *cort. pruni virg.* of commerce is generally that collected in autumn it would be difficult to say, but as we have to use it as we get it, it is only fair to judge it as it comes. Half a dozen samples were obtained from leading houses, and the yield of hydrocyanic acid estimated. This was done by distilling the fine powder with water and titrating the distillate with centinormal silver nitrate solution.

The following were the results per cent.

1	·079
2	·082
3	·137
4	·107
5	·160
6	·133

The preparations in general use are the liquid extract, infusion, and syrup of the United States Pharmacopœia, and the syrup and tincture of the Unofficial Formulary.

The strength of the liquid extract should be 1 ounce in 1 fluid ounce. Commercial samples of it gave the following amounts of hydrocyanic acid in grams per 100 c.c.:—

1	·030
2	·000
3	·000
4	·019
5	·008
6	·016

I can only account for the negative results in Nos. 2 and 3 by supposing them to be made by some process in which the whole of the extractive was heated. The others are much below that indicated by the average yield from the bark.

A sample of the liquid extract was then made with the bark No. 3, containing ·137 per cent. of HCy, the directions of the United States Pharmacopœia being strictly followed. The product was found to contain ·084 per cent. From this it seems that the menstruum which remains unheated is insufficient to readily extract the whole of the acid.

Samples of the infusion, eight times concentrated, were then estimated in the same way. These should represent 32 per cent. of bark. The results were:—

1	·0029
2	·0000
3	·0067
4	·0000
5	·0019
6	·0029

Here again the quantities of acid are much below the theoretical amounts. Nos. 1 and 4 were very much darker than the others. Both of these contained glycerine and appeared to be made by diluting the liquid extract.

A pint of concentrated infusion was made with No. 3 bark. The bark in No. 40 powder was damped with water, left to macerate for 24 hours and then percolated with water till 14 fluid ounces had been collected. This was reserved and the percolation continued till exhaustion was effected. These last runnings were evaporated to one fluid ounce and added to the first portion together with 5 fluid ounces of rectified spirit. On estimating the product the percentage of HCy was found to be ·0428, the theoretical yield being ·0457. Another sample of exact U.S.P. strength made by percolation was found to contain the full amount.

The syrup represents 12 per cent. by weight of the bark. The following were the percentages by weight of HCy found in some commercial samples:—

1 . . . . . ·0007
2 . . . . . ·0000
3 . . . . . ·0011
4 . . . . . ·0014
5 . . . . . ·0029
6 . . . . . ·0005

These results are also below the proper yield. A sample made from bark No. 3 in No. 20 powder according to the U.S.P. process gave ·0152 per cent., the theoretical yield being ·0164.

In the same way six samples of tincture, B.P.C., were examined. The strength should be 1 ounce in 5 fluid ounces, but the quantities of prussic acid found were in this case also too low, the results in grams per 100 c.c.'s being—

1. . . . . ·009
2. . . . . ·000
3. . . . . ·008
4. . . . . ·012
5. . . . . ·007
6. . . . . ·016

A sample made from No. 3 bark yielded ·0228, the theoretical amount being ·0274.

It is evident from these results that the preparations of wild cherry bark do not as a rule represent the full value of the drug, so far as the hydrocyanic acid is concerned. If the hydrocyanic acid found in the six samples of bark may be taken as the usual percentage, not one of the preparations examined can be said to be near its proper strength. This may be caused by the loss of some of the acid in keeping, or else sufficient care is not exercised to ensure its presence. Experiment shows that the infusion, syrup, and tincture may be made of proper strength provided the proper methods be employed, and the products kept free from exposure. The liquid extract does not seem so satisfactory, and the practice of making the other preparations from it by dilution should not be countenanced, unless some means be employed to make it of definite strength, as by the addition of hydrocyanic acid. Although the hydrocyanic acid exists in a very small proportion, there is no reason why this proportion should not be secured. If the preparations in use only contain a small fraction of what they should do, and these fractions vary considerably among themselves, it cannot be expected that *Prunus Virginiana* will obtain the reputation here which it is claimed to deserve in America.

The PRESIDENT said this was one of those contributions similar to those they had had on former occasions upon cherry laurel water, and similar bodies containing minute quantities of hydrocyanic acid. There was no reason why the preparations should not be standardized in the way indicated by the author. The bark was not very largely employed in this country, but still it had some uses.

Mr. MABEN said his only experience was of the syrup; he knew nothing of the tincture or the infusion. Formerly it certainly did deteriorate by keeping, to a very large extent, but when prepared according to the formula of the United States Pharmacopœia, as recommended in the B.P.C. Formulary, it kept better, and if kept from exposure it would be found to be pretty permanent.

Mr. WELLCOME said the wild cherry bark, when freshly gathered, had a very delightful aromatic flavour, which rarely lasted more than six months after the gathering; it never kept its full flavour for more than a year. It was in its greatest perfection in the autumn and early winter. It was gathered both in the autumn and early spring; in the spring the bark left the trees easily. Its greatest use in the United States was as a flavouring agent, although it was used extensively for making pick-me-ups, wild cherry bitters and such beverages, and it was claimed by many authorities that it possessed decided tonic and nervine properties. No preparation should be made from bark more than a year old.

The following two papers were then read:—

INFUSION OF GENTIAN.

BY WILLIAM JOHNSTON.

There are many who think that the British Pharmacopœia should contain recipes for the more commonly used infusions kept ready in a concentrated form by dispensers. I feel that there is some good ground for this desire; and should be glad to hear the matter discussed in Conference, and to see some practical outcome of the discussion when the next edition of the B.P. is taken in hand. I will try to give a point to the debate by proposing a formula for one of the most frequently ordered of the infusions, viz., that of gentian. Although I have not seen the method published before, nor heard it described, no great originality is claimed for it. Any practical man, by taking a little thought, could have planned it all in ten minutes. It is a suitable process for working on the small scale. It is as follows:—

Take of

Bitter orange peel, bruised Gentian root, bruised	of each, 3 ounces.
Fresh lemon peel	6 ounces.
Rectified spirit	7½ fluid ounces.
Cold distilled water	15 ounces.
Boiling distilled water	a sufficiency.

Mix the orange peel and gentian root with the spirit and cold water, and, into the mixture contained in a suitable vessel, such as a wide-mouthed jar to which a bung can be fitted, grate the lemon peel. This is best accomplished as follows: weigh the lemons—about six, if of medium size; rub off the yellow portion of the rind against a coarse grater; pare off, as thinly as possible, as much of the spongy part as may be found saturated with the essential oil, and add the parings to the mixture; again weigh the lemons, noting the loss, which will correspond with the weight of peel obtained. If necessary, increase that weight to six ounces with more grated peel. Macerate for seven days, stirring occasionally; strain through a press bag or piece of calico, and press out the rest of the infusion. Remacerate the marc with about twelve ounces of boiling distilled water for twelve hours, and again press. Mix the liquid obtained with the previous portions, and set aside for a few days, afterwards filtering and making up with distilled water to a pint and a half.

Though the repercolation process described by Mr. J. Wilson in the *Pharmaceutical Journal* for January 21, 1888, is no doubt a good one, I consider that now given simpler and more likely to meet with the approval of small makers. The price (which comes out about a shilling a pound, exclusive of labour) is satisfactory, and the quality of product excellent. When one part of it is mixed with seven parts of distilled water, the resulting fluid is exactly the same in colour, aroma, and bitterness as the freshly made B.P. infusion; whereas, I have noticed that the concentrated preparation obtained from many wholesale houses is darker in colour when diluted and less fragrant than the pharmacopœial article. The present official formula might still remain as an alternative one, leaving dispensers to choose whichever they preferred. In large dispensing businesses, the old way would probably be retained, because of the saving in spirit; but in smaller ones, a reliable, ready-made "concentration" would often, in busy moments, be hailed as a boon. Some are deterred from using such dispensing conveniences because they are not recognized "by authority." It may be objected that the formula now given is for a weak tincture instead of an infusion; but

surely that is rather hypercritical. The difference in therapeutical effect must be practically nil; and if a physician did wish, for some reason, to prescribe an article quite free from alcohol, it would be a very simple matter for him to write "Inf. Gent. Co. Recent.," in his prescription.

It is not meant to be inferred that *all* the infusions are so amenable to concentration as the one now treated of. Thus, it would be somewhat difficult to make a 1 to 7 infusion of cascarilla as aromatic as a fresh one; and, I understand, no concentrated infusion of digitalis is at all equal in value to the "impromptu" preparation. Still, the principle might be adopted wherever it conveniently could, which is certainly the case with the infusion of gentian and a number of others.

Tincture of Lemon Peel.

BY WILLIAM JOHNSTON.

As a sequence to the suggestion just thrown out for the manipulation of the lemon peel in the making of infusion of gentian, I would recommend that the B.P. formula for tincture of lemon peel be altered to the following:—

"Take of—

Fresh lemon peel, grated	5 ounces.
Proof spirit	2 pints.

"Macerate for seven days, in a closed vessel, with occasional agitation; strain, press, and filter; and then add sufficient proof spirit to make one pint.

"The peel should be obtained direct from the lemons (about five will be required, if of medium size) by rasping off the yellow portion against a rough grater held over the spirit, afterwards thinly paring off the spongy portion of rind saturated with oil and adding the parings to the spirit. The weight of peel obtained may be found by weighing the fruit before and after peeling."

The advantages of this method are these: practically no loss of essential oil by evaporation; increased facility in reducing the peel to maceration state; and, probably, improved exhaustion.

The tincture of fresh orange peel might be made in the same way; only it is so seldom prescribed that its formula is scarcely worth tinkering.

The PRESIDENT said he never could quite understand why the Pharmacopœia directed the tincture of fresh orange peel to be made with rectified spirit, and the tincture of lemon peel to be made with proof spirit. Recurring to the discussion on the previous day, there seemed to be a certain amount of rule of thumb with regard to the strength of spirit to be used in these matters. The tincture of fresh orange peel, as now prepared, appeared to be by far the better preparation of the two, and he saw no reason why tincture of fresh lemon peel should not be made by the same process. The peel always contained a considerable quantity of water. Although not sufficiently large to bring the spirituous strength down to that of proof spirit, it would certainly reduce it, and if any alteration were made it should be in that direction.

Mr. LINFORD pointed out that tincture of fresh orange peel deposited its oil on mixture with water, whilst tincture of lemon peel did not, and the intention was probably that one should be mixed with water and the other used in elixirs and similar preparations.

Mr. WILLIAMS said much more elegant preparations were made with the tincture made with a weaker spirit, and a better flavour was also obtained. The finest flavour was obtained by using a spirit about sixteen over proof to start with. When the process was completed it was generally about sixteen under proof.

The next paper was—

Exact Formulæ for the Official One Per Cent. Liquors.

BY C. A. MACPHERSON.

Liquor Arsenicalis.

Take of—

Arsenious acid in powder	of each 35 grains or 1 part.
Carbonate of potassium	
Compound tincture of lavender	2 fluid drachms or 3·125 fluid parts
Distilled water a sufficiency to make	8 fluid ounces or 100 fluid parts.

Place the arsenious acid and the carbonate of potassium in a flask with 4 ounces or 50 parts of the water, and apply heat until a clear solution is obtained. Allow this to cool. Then add the compound tincture of lavender, and as much distilled water as will make the bulk 8 fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.)

Liquor Arsenici Hydrochloricus.

Take of—

Arsenious acid in powder	35 grains or 1 part.
Hydrochloric acid	48 minims or 1·25 fluid parts.
Distilled water, a sufficiency to make	8 fluid ounces or 100 fluid parts.

Boil the arsenious acid with the hydrochloric acid and 2 ounces or 25 fluid parts of the water until it is dissolved, then add as much distilled water as will make the bulk 8 fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.).

Liquor Arsenii et Hydrargyri Iodidi.

Take of—

Iodide of arsenium	of each 35 grains or 1 part.
Red iodide of mercury	
Distilled water, a sufficiency to make	8 fluid ounces or 100 fluid parts.

Triturate the iodides with about 1¼ ounce or 15 parts of the water until nearly all is dissolved, then pass through a filter, and wash the latter with sufficient distilled water to produce 8 fluid ounces, or 100 fluid parts, of solution at 60° F. (15·5° C.)

Liquor Atropinæ Sulphatis.

Take of—

Sulphate of atropine	35 grains or 1 part.
Camphor water, a sufficiency to make	8 fluid ounces or 100 fluid parts.

Dissolve.

The solution should measure 8 fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.).

Liquor Morphinæ Acetatis.

Take of—

Acetate of morphine	35 grains or 1 part.
Diluted acetic acid	70 minims or 1·8 fluid parts.
Rectified spirit	2 fluid ounces or 25 fluid parts.
Distilled water, a sufficiency to make	8 fluid ounces or 100 fluid parts.

Mix the acid, the spirit and 4 ounces, or 50 parts, of the water, and dissolve the acetate of morphine in the mixture, then add sufficient distilled water to make the solution measure 8 fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.).

Liquor Morphinæ Hydrochloratis.

Take of—

Hydrochlorate of morphine	35 grains or 1 part.
Diluted hydrochloric acid	70 minims or 1·8 fluid parts.
Rectified spirit	2 fluid ounces or 25 fluid parts.
Distilled water, a sufficiency to make	8 fluid ounces or 100 fluid parts.

Mix the acid, the spirit and 4 ounces, or 50 parts, of the water, and dissolve the hydrochlorate of morphine in the mixture, then add sufficient distilled water to make the solution measure 8 fluid ounces, or 100 parts, at 60° F. (15·5° C.).

Liquor Potassii Permanganatis.

Take of—	
Permanganate of potassium	35 grains or 1 part.
Distilled water, a sufficiency to make . . .	8 fluid ounces or 100 fluid parts.

Dissolve.

The solution should measure 8 fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.).

Liquor Sodii Arseniatis.

Take of—	
Arseniate of sodium rendered anhydrous by a temperature not exceeding 300° F. (148·9° C.).	35 grains or 1 part.
Distilled water, a sufficiency to make . . .	8 fluid ounces or 100 fluid parts.

Dissolve.

The solution should measure 8⅛ fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.).

Liquor Strychninæ Hydrochloratis.

Take of—	
Strychnine in crystals . .	35 grains or 1 part.
Diluted hydrochloric acid	54 minims or 1·4 fluid parts.
Rectified spirit	2 fluid ounces or 25 fluid parts.
Distilled water, a sufficiency to make . . .	8 fluid ounces or 100 fluid parts.

Mix the hydrochloric acid with 2 ounces, or 25 parts, of the water, and dissolve the strychnine in the mixture by the aid of heat. Then add the spirit and sufficient distilled water to make the solution measure 8 fluid ounces, or 100 fluid parts, at 60° F. (15·5° C.).

In a paper read before the Pharmaceutical Society at an evening meeting in Edinburgh in November, last year,* it was shown that the formulæ given in the Pharmacopœia for what are known as the 1 per cent. solutions do not yield products in accordance with their reputed strength, and that there is an indefiniteness about these preparations which is not desirable. With special reference to the strychnine solution, it was pointed out also that the proportional parts formula differs materially from the imperial weights and measures one, and an amended formula was given for this preparation whereby a true 1 per cent. solution can be obtained, identical in composition, whether the imperial or the proportional quantities be used. Dr. Attfield having suggested the supplementing of the paper referred to by another containing formulæ for all the solutions of this class, corrected and arranged in the same manner as the one already given, the subject was again taken up, and the formulæ contained in the first part of this paper were constructed. For the sake of uniformity, imperial quantities for 8 ounces of solution have been given in each case, otherwise official data have been adhered to, except in so far as it was necessary to amend them to bring the finished products into consonance with their pharmacopœial reputed strength.† In Donovan's solution the change has been made from 1 part in 100 by weight nominally to 1 by weight in 100 by measure, the advantage of which is obvious. The slight addition of arsenious acid which it has been necessary to make to the arsenical solutions will not affect the characters and tests given in the Pharmacopœia further than to entail the increase of the quantity of the volumetric solution of iodine used in testing the specified quantity of solution from 875 to 883 grain-measures: the specific gravity will practically remain as at present.

Some of the formulæ contain fractions in the centesimal column which may seem to cause a difficulty in working from them, but on closer inspection it will be seen that they do not form any obstacle. However, should it be thought that other fractions such as ·25, ·5, or ·75 would conduce to render the proportional formulæ better adapted for use, they could easily be substituted without materially affecting the character of the respective solutions. Thus, in liquor arsenicalis, by substituting four drachms forty-eight minims of compound tincture of lavender for five drachms in a pint of solution—which is equal in round numbers to one hundred and fifteen minims in eight fluid ounces—the proportion would be altered from 3·125 to 3 per cent., and the colour of the solution would not be sensibly affected. In the morphine solutions, by using the acids in the proportion of 168 minims in the pint—say 67 minims in the 8 fluid ounces—the percentage would be 1·75 instead of 1·82 as at present; and in the strychnine solution the use of 48 minims of acid instead of 54 minims in the 8 fluid ounces would be equal to 1·25 in place of 1·4. In the latter instance the quantity of acid would still be a little over one-fourth more than is necessary to convert the strychnine into hydrochlorate, while in the former the comparatively large amount of acid present could easily allow of the reduction being made.

The proportional parts formulæ present no difficulty when the unit consists of the ounce or its multiples, but when grains and grain-measures are in question it is necessary to emphasize the caution not to confound grain-measures with minims—an error liable to happen in the present state of our weights and measures. To facilitate the conversion of grain-measures into minims, it may be stated as a general rule, sufficiently accurate when small quantities are concerned, that one-tenth of the sum added to any given number of grain-measures will show the equivalent number of minims which require to be used.

Mr. MARTINDALE said this matter was of some importance, because the Pharmacopœia was in a very inconsistent position, these solutions being neither percentage by weight or by measure. Take the morphine solutions, they were one part of morphine salts in each case to 99 grain measures, which did not produce 100 grain measures, nor did they produce a definite weight. The writer suggested that they should have actual centesimal parts by measure or centesimal parts by weight. In the case of morphine solutions the spirit present in the solution interfered with that number of centesimal parts by weight. The inconsistency of the present system had been shown, but if they were to approach the continental mode and that of the United States Pharmacopœias they would be consistent; since those works directed one part of a drug to be contained centesimally in so many parts by weight. They also fell into another error on the other side, because as a rule the medicine would be administered to the patient by measurement, and in that way an accurate quantity of the drug would not be administered, because it would not be known exactly the quantity of the drug contained in the measured part without going through a long process of calculation.

The PRESIDENT asked if it was not the practice on the continent invariably to weigh rather than to measure in dispensing.

Mr. MARTINDALE said dispensing on the continent was carried on essentially by weighing. The English pharmacists rather kicked at that, and thought it was done more expeditiously and accurately by measure.

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* *Pharm. Journ.*, [3], xix., 433.

† Each solution contains four and three-eighths grains of its particular active ingredient in every fluid ounce or 1 part by weight in every 100 similar parts by measure.

The PRESIDENT said it was clearly not more accurately done.

Mr. MARTINDALE said English dispensers thought they could conduct the process more expeditiously and more accurately in the case of small quantities. You could put a grain of hydrocyanic acid into an 8 ounce bottle by measuring so many minims much more quickly and accurately than by balancing on a scale and weighing it in.

Mr. MACLAREN said he knew Mr. Macpherson, and had heard his previous paper read, but to his way of thinking he had taken as the basis of measuring for dispensing purposes grain measures; now that was not so, they took minims, which was quite a different thing altogether; the grain was 437·5 to the ounce and the minim 480. A liquor, one minim of which represented one-hundredth of a grain, should be made of the strength of 96 grains to the pint instead of 87·5, as calculated by Mr. Macpherson.

Mr. YOUNG (Barnet) said the question was how the medicine was administered to the patient. Mr. Martindale had expressed some interest with regard to the accuracy of minims and grains, but while medicine was administered by the teaspoonful he thought they need not split straws as to whether it was measured or weighed.

Mr. MARTINDALE remarked that in the case of hypodermic injections, which were given by graduated syringes in minims, it would make a serious error, in some cases amounting to as much as one-tenth.

Mr. MABEN remarked that so long as they had to dispense prescriptions by measure it was impossible to introduce parts by weight, and the Pharmacopœia must continue to have parts by measure. Owing to the difference in specific gravities they would come into endless difficulties if weighing were attempted to be introduced. With reference to Mr. Maclaren's objection he thought he had found a mare's nest. They had nothing whatever to do with whether a minim and a fluid grain were the same thing.

Mr. MACLAREN said what he wished to point out was that Mr. Macpherson had given statistics which showed that he was in error. He had stated a weighed measure instead of a measured quantity.

Mr. PLOWMAN said there was one other aspect of the question to be considered, and that was the prescriber's. It was no use discussing this question until prescribers were educated to prescribe in a different fashion. So long as they prescribed by measure the chemist must follow them, and until medical men were educated possibly in better ways they must, in order to get what was commonly called, but what they knew not to be, one part in 100, put up with the prescribers' conventional one part in 100. The only possible method was to ignore all ideas of specific gravity, and simply to have one grain in 100 minims.

Mr. MACEWAN said that was just the point at the bottom of this whole difficulty. He believed the reason why the centesimal liquors were introduced into the Pharmacopœia was the desire expressed by the International Congress at Brussels to have all potent solutions made of the strength of one in 100. Instead of being of the strength of one grain in 100 minims the Pharmacopœia recognized 1 grain in 100 fluid grains.

Mr. MARTINDALE said no, it was one part added to ninety-nine fluid parts.

Mr. MACEWAN said he quite recognized the fact that the person who drew up the formulæ had not succeeded in making them exact, but the point he was aiming at was 1 grain in 100 fluid grains, although he did not quite succeed. If a doctor, for instance Mr. Plowman, wanted to prescribe a liquor, and imagined he was getting in 10 minims $\frac{1}{10}$th of a grain of the drug he was entirely wrong. There was only $\frac{1}{10}$th of a grain in 10 fluid grains, and he maintained that the chemist and druggist could not dispense by fluid grains. The fluid grain was not recognized by the Weights and Measures Act.

The PRESIDENT said this was a matter evidently for thought, and when the paper appeared in type they might think the matter over, and someone would no doubt send some contributions to the Journal or some other publication on the subject.

(*To be continued.*)

Parliamentary and Law Proceedings.

SUICIDE OF A CHEMIST.

On Tuesday, October 22, Mr. T. H. Stanley held an inquest at Bloxwich, on the body of Arthur James Newton (35), chemist, High Street, Bloxwich.

Evidence was given showing that deceased had been suffering from sleeplessness for five weeks, and had taken laudanum to procure sleep. On Sunday morning he was heard shouting in a very peculiar way, and he was found with a small jar of extract of nux vomica near him. Dr. Hubbard was summoned, and in reply to him deceased said he had taken about 2 drachms of the extract. The stomach-pump was applied, but death ensued almost immediately.

Dr. Hubbard, in his evidence, said that judging from what came from deceased he had probably taken enough to destroy thirty people.

The jury returned a verdict "That deceased died of poison administered by himself, and that he was at the time of unsound mind, but there was no evidence to show whether he took the poison accidentally or otherwise."

Obituary.

Notice has been received of the death of the following:—

On the 21st of August, Mr. Solomon Perry, Chemist and Druggist, Tavistock. Aged 68 years.

On the 22nd of October, Mr. Horie Holt, Chemist and Druggist, Duke Street, Lower Broughton, Manchester. Aged 53 years.

On the 25th of October, Mr. John Henry Rosson, Chemist and Druggist, High Street West, Glossop. Aged 39 years.

On the 25th of October, at Newcastle, Mr. Robert Mennie, Chemist and Druggist, late of Falkirk. Aged 23 years.

Review.

WANDTAFELN ZUR MICROSCOPIE DER NAHRUNGS- UND GENUSSMITTEL AUS DEM PFLANZENREICHE. Alfred Hölder, Vienna, 1889.

Recognizing the want of good diagrams to illustrate the microscopical structure of articles used as food and condiments, such as might be employed by scientific lecturers or university professors, D. Josef Nevinny, Assistant-Professor of Pharmacognosy and Pharmacology at Vienna University, has made a series of careful microscopical preparations, which have been drawn by Dr. C. Henning and are now in course of publication in Vienna. The series will comprise 60 diagrams in all. The sheets are about three feet long by two wide, and the microscopical details, printed in black and white, are accurately delineated and are of sufficient size to be seen at a considerable distance. The four diagrams already published are tea, saffron, marigold flowers and paprika. The salient characters have been carefully selected with the view of rendering the diagrams useful for teaching the means of detecting adulterations

of food. Thus the characteristic idioblasts of the tea leaf and the pollen of the calendula and saffron crocus, the papillæ of the stigma and the papillose epidermal cells of the corolla are clearly shown. The list given in the prospectus of the work includes a large number of drugs, etc., used in pharmacy, among which may be noticed cloves, clove stalks, cassia buds, cinnamon, cassia, sandalwood, ginger, turmeric, dandelion, star anise, cardamoms, nutmeg, mace, almonds, linseed, vanilla, pimento, pepper and ergot.

There can be no doubt that these excellent and truthful diagrams will prove an invaluable aid to the teacher, and as they cost only about two shillings each, there is no reason why they should not speedily come into general use. They are also admirably suited for illustrating museums of food products and economic botany. It is proposed to publish four to six parts every year, each part containing four diagrams.

The only improvement possible to suggest in the diagrams would be that in cases where epidermal and the subjacent tissue are shown in one figure, the line of demarcation might be more distinctly indicated by a lighter shade and a darker one for the respective layers, which at present must, to a novice, appear as if the two had a continuous surface. This of course could also be easily effected by using colouring to indicate the subjacent layer.

Correspondence.

A Contribution to the Physiological Action of the Seeds of Gorse (Ulex Europœus).

Sir,—In the early part of the month of August, 1889, I was walking along a grassy lane in South Lincolnshire, where there was an abundance of gorse, then bearing an immense number of mature legumes. On opening some of the legumes I found two, three or four seeds in each, and being aware that furze constitutes a valuable food, when bruised, for cattle during the winter months, I adopted the line of reasoning that if the shrub were edible, surely the seed could not be poisonous. Acting on that belief, as nearly as I can remember, I ate the seeds obtained from twenty to twenty-five pods, probably eighty seeds altogether. Within half an hour from commencing to eat the seeds there was experienced a sudden sensation of stupor, prostration, and vertigo; succeeded in a few minutes by a cold, clammy perspiration and an intense nausea. Those symptoms were immediately followed by sickness of the most distressing character, which the least movement of the head appeared to intensify and reproduce. The concomitant effects were general prostration and loss of power in the lower extremities, so that it was necessary to cling to objects to prevent falling. The sickness continued at frequent intervals from 2 p.m. until 9 p.m., when the toxic effect began to abate. During the whole time the sickness lasted there was a most disgusting smell and taste of the peculiar leguminous flavour of the seeds.

The greatest relief was experienced from the administration of oatmeal gruel, about 9 p.m., but even that was not retained on the stomach.

There can be little doubt but that had sickness not supervened there would have been a sufficiency of seeds taken to have caused a fatal result. It is manifest that we have in the seeds of gorse an emetic of the most powerful description, and doubtless its peculiar properties are deserving of further elucidation.

George Welborn.

P.S.—Since writing the above I have had my attention called to the paper on "Ulexine," by Messrs. Gerrard and Symons, in the *Pharmaceutical Journal* for June 22 last.

Administration of the Benevolent Fund.

Sir,—In reference to the suggestion that the election of annuitants on this Fund should be carried out by the Council of the Pharmaceutical Society I wish to point out that it would have the advantage of saving, 1st, the expense of voting papers; 2nd, the expense to candidates for cards and postage; 3rd, the expense of time and exertion incurred by their friends and supporters; 4th and lastly, but that most important consideration, saving the painful publicity given to every case.

As it is, the Committee decide on the merits of each case, and it must continue to do so. I have been utterly unacquainted with more than two for whom I have ever voted—and have used the privilege merely on the recommendation of some wholesale firm who probably had no personal acquaintance with the object of their good wishes. Then, again, not more than half the voting papers are returned to the Square.

The medical profession has a Benevolent Fund for its numerous poor brethren, but no one knows who are the recipients of the charity outside the Committee appointed for its distribution. Thus the inevitable degradation of many a sensitive nature is prevented.

I believe the funds of the Society would be increased and more justly distributed if this new departure were adopted. The Local Secretaries in every town or district would find it not a difficult matter to sift every case, so that no applicant might be placed on the list of candidates who was unworthy of the distinction.

In conclusion, allow me to add, I should, if the Committee decide to take the affair into their own hands, make an effort to increase my subscription, and to induce others to do the same, whether they at present pay one or two "widow's mites, which equal one farthing."

The payment of 5*s*. per annum by every chemist and druggist would place the Fund in a more prosperous and healthy position. Septuagenarian.

Vinum Ipecacuanha by Fractional Percolation.

Sir,—When making a stock of ipecacuanha wine about a year ago I thought fit to evaporate the percolate in fractions. Operating on 8 ounces of root the first pint of percolate was evaporated to a soft gelatinous consistence, which, scarcely losing by continuation of heat, as found by weighing at intervals of about half an hour, was mixed with a portion of the sherry. The percolation was continued for 3 pints more. Just about this time a client who had eaten more fish than could be well digested asked for an emetic, and half an ounce of the new ipecacuanha wine acted almost immediately.

Having a further supply to make shortly after the Pharmaceutical Conference discussion on the subject notes were taken of the process. Making 1 gallon, 8 ounces of root, coarsely powdered, placed in the percolator and the acetic acid poured on; this being rather more than was required to moisten, what passed through was poured back and mostly absorbed. After twenty-four hours percolation was commenced by adding 10 ounces of distilled water night and morning. The first 25 ounces of percolate (an oversight, as I had intended taking out at 20 ounces), yielded 5 ounces of dark-brown gelatinous extract; the next 20 ounces of percolate yielded 60 grains, and the following 10 ounces only 4 grains of dry brittle extract. It was considered unnecessary to go further with the process.

The product scarcely smells acetous, and last year's make kept well. The result shows that the B.P. formula may be made easier (and, I think, without risk of imperfect exhaustion of the drug) by using about one-third the water.

It would also be interesting to know if the evaporation in fractions has any real advantage over the B.P. method. At any rate, the greater part of the extract is subjected to heat for a shorter time, though the evaporation of the second and third percolates is so much more rapid that possibly when the necessary quantity of water required is known the alkaloid would not have suffered more by one evaporation than by the three. Probably by working on larger quantities of root even less water would be required.

Northampton. J. Clower.

Associate in Business.—The sale of the article under its proper name would involve the necessity for the seller holding a licence.

Communications, Letters, etc., have been received from Messrs. Morrison, Taylor, Spurr, Giles, Associate, A. C.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 9, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

THE Council meeting last Wednesday was attended by seventeen members, the absentees on that occasion being Messrs. ABRAHAM, EVANS, HAMPSON and WATT. Diplomas were granted to fourteen persons who had been duly registered as Pharmaceutical Chemists, one person was elected a member of the Society, and twenty-two persons were elected Associates of the Society. The report of the Finance Committee furnished an indication that the Society's new buildings are progressing satisfactorily, inasmuch as it recommended that payments should be made to the contractors during the present month on the certificates of the architect. Reference was incidentally made to the satisfactory condition of the Benevolent Fund balance, which will enable the Committee to pay the annuitants in January out of the present year's receipts. It is encouraging to learn that there has been a good response to applications which have been made for support, and that the efforts which have been made in that direction by the Secretary, the Local Secretaries throughout the country, and by others have been productive of such good results. The uninvested donations have now reached the amount of forty-seven pounds, and as the investment of receipts on this account is necessary, according to the regulations, there is now an opportunity of increasing the invested funds to the extent of a hundred pounds for any one who desires to make up that sum. The report of the Benevolent Fund Committee recommended that one grant of ten pounds and two grants of five pounds should be made, and stated that the consideration of other cases had been deferred for further inquiry. The President took occasion to correct the misapprehension that appears to have arisen in some quarters as to the remarks made at the previous Council meeting in reference to suggested alterations in the mode of electing annuitants. Those remarks should be regarded as they were intended, merely as expressions of individual opinion concerning a possible means of doing away with the need for canvassing, which is considered by some as being one of the most objectionable conditions appertaining to the administration of the Benevolent Fund. In all instances the members of Council who thought the proposed change might be useful in that respect were also of opinion that other points had to be considered as well, and that in any case the opportunity for making such a change was still very remote, and could only become possible in the event of certain objections to the proposed plan being removed. On reference to the official report of what took place it will be seen that this was the case.

On the presentation of the report of the Library, Museum, Laboratory and House Committee a discussion arose on the subject of lending books from the Society's library. It appears that a large number of the books are annually sent into the country on loan, and that it has been found necessary to provide duplicate copies of books of reference which are thus in demand, so as to have one copy that can be retained always in the library and one copy to lend. That is an arrangement which is calculated to be of very great advantage in many respects, but it is evidently one which cannot be carried out beyond certain limits without unduly appropriating to that purpose funds that should be available for the continued extension of the library. For instance, text-books and most works of an educational character are not the class of books that the Society should be called upon to lend. Every apprentice ought to provide himself with books of that kind. Even in the case of works of a more elaborate and expensive kind it seems to be in the interests of the library an essential condition that no book should be lent unless there be a duplicate copy. The opinion expressed by Mr. SCHACHT that the library would be more used if principals and advanced students thought they would be pretty sure to find there what they wanted illustrates the necessity of maintaining the efficiency and repute of the Society's library as a resource for reference, and the case he mentioned of LOTHAR MEYER'S 'Chemistry' having been out when he desired to see it seems to point to the necessity for a limitation of the books which can be borrowed. There is good reason for thinking that MEYER'S 'Chemistry' is not the kind of book requiring to be kept in duplicate in the Society's library, and if that be the case it ought not on any account to be lent out. This seems to be a situation in which it is necessary to choose the lesser of two evils, and if members living at a distance are unable to enjoy so full a use of the Society's library as those living in London, that is scarcely a reason why the library should be at any moment deficient of any of its books. The real necessity pointed to would seem to be that of establishing provincial libraries in connection with the local pharmaceutical associations through the country, such as were spoken of by Mr. ATKINS and Mr. SOUTHALL as existing in Sheffield and Birmingham. To form reference libraries is one of the most possible lines of activity at the present time for such associations, and in that way much of the need for borrowing books from the Society's library would be done

away with. Mr. Newsholme's suggestion as to the payment of the carriage of books lent to apprentices in the country may be regarded as an expression of the earnest solicitude he has always manifested for the promotion of study among the younger members of the trade. In that sense it calls for sympathy, especially when it is remembered that under existing conditions young men have not only to be induced to join the Society, but also to apply themselves to study, but we must on the whole confess to thinking, with the Vice-President, that almost all the real requirements in the way of borrowing books could be satisfied as things now are, and that if some little outlay be requisite in particular instances, it would be in every way worth while to incur it.

On the subject of railway rates, which is now under consideration by the Board of Trade, it would seem that the points affecting chemists and druggists are to a great extent eclipsed at present by questions affecting still larger interests. It seems probable that some considerable time must elapse before any sensible progress can be made towards a settlement of the entire matter in dispute, but it is at least deserving of notice that the railway representatives disclaim any intention of raising their actual charges, and declare that they consider it their interest to maintain good relations with their customers.

An Evening Meeting of the Pharmaceutical Society in London will be held at 17, Bloomsbury Square, on Wednesday evening next, the 13th inst., when a communication from the Research Laboratory on "The So-called Mussænda Coffee of Réunion," by Professor Dunstan, will be read, and a paper "On the Occurrence of Pararabin in Sterculia Gum," by J. H. Maiden, F.L.S., F.C.S. The chair will be taken at eight o'clock, but the lecture theatre will be opened an hour earlier to afford an opportunity for the inspection of specimens and apparatus that may be exhibited.

* * *

An Evening Meeting of the Society will also be held in Edinburgh, at 36, York Place, on Wednesday evening, November 20, at half-past eight o'clock, when an Inaugural Address will be delivered by Professor T. R. Fraser, M.D., F.R.S.E.

* * *

A meeting of the chemists and druggists of Sheffield and district will be held in the rooms of the Sheffield Pharmaceutical and Chemical Society, on Wednesday evening next, commencing at 8.45, when the subject for discussion will be "Who is the Seller of a Poison under the Pharmacy Act?"

* * *

The Annual Conversazione of the Chemists' Assistants' Association is to be held on Thursday evening next, at the Portman Rooms, Baker Street.

* * *

The opening meeting of the School of Pharmacy Students' Association will be held on Thursday, November 14, when the election of officers will take place, and an Introductory Address will be delivered by Professor Green. The chair will be taken at 7 p.m. by the President, Professor Attfield.

* * *

We regret to state that information has been received of the death on the 3rd inst., of Mrs. Catherine Mary Amelia Sutterby, who was elected an annuitant on the Benevolent Fund in 1882.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, November 6, 1889.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Allen, Atkins, Cross, Gostling, Greenish, Harrison, Hills, Leigh, Martin, Martindale, Newsholme, Richardson, Robbins, Schacht and Southall.

The minutes of the last meeting were read and confirmed.

Diplomas.

The undermentioned, being duly registered as Pharmaceutical Chemists, were respectively granted a diploma stamped with the seal of the Society:—

Bygott, John William.
Cargill, David Allan.
Davies, David Sidney.
Flint, Charles.
Foster, Murray Toogood.
Jeffcoat, Joseph George.
Jones, William Thomas.
Lakeman, Nicholas Frank
Sayers, William Charles.
Seccombe, Charles William.
Peck, Ernest Saville.
Stonham, Herbert Lovett.
Stuart, William.
Tabor, Thomas Slade.

Elections.

MEMBER.

Pharmaceutical Chemist.

William Charles Sayers, of Lewisham, having passed the Major examination, and tendered his subscription for the current year, was elected a "Member" of the Society.

ASSOCIATES.

The following having passed the Minor examination, and paid (as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society.

Andrew, John Herbert .....Oldham.
Barclay, John ....Birmingham.
Blanchford, Reginald Arthur..Sutton.
Bush, James Edward .....Dunmow.
Carpenter, Albert Hemsley ...London.
Cooling, Francis Charles .....Bath.
Cullen, Frederick Spencer ...Norwich.
Douthwaite, Hy. Lonsbrough..Pocklington.
Geen, Charles Alfred .....Exeter.
Griffiths, William Robert .....Clynderwen.
Innes, John .....Douglas.
Kent, Thomas Oliver .....Wye.
Lord, William Butler.....Lancaster.
Lunn, Arthur .....Cambridge.
Lyne, Walter Henry .....Grantham.
Morrow, Charles .....Hornsea.
Poll, George John .....Wells, Norfolk.
Robinson,Bernard Christopher.Wolverhampton.
Severs, Charles .....Kingston-on-Thames
Smith, Richard Silcock.....Norwich.
Taylor, James .....Eccles.
Tingle, Joseph Grantley .....Kettering.

The name of the following person who has made the required declaration and paid a fine of one guinea, was restored to the Register of Chemists and Druggists:—

James Lloyd, 123, Battersea Road, London, S.W.

Several persons were restored to their former status in the Society upon payment of the current year's subscription and fine.

Reports of Committees.

FINANCE.

The report of this Committee was of the usual character, and included a recommendation that a sum not exceeding £1500 be paid to the contractors for the new building during the month of November on the certificates of the architect.

The PRESIDENT, in moving the adoption of the report, said the Benevolent Fund was in a very satisfactory condition, the subscriptions having come in rather better than usual at this season of the year, and amounting to £181. The Committee would be able to pay the annuitants next January out of this year's receipts, which was not always the case. It was a subject for congratulation that the friends in the country had responded very satisfactorily to the usual application made to them, and the Council should know that the Secretary by his private efforts in this direction towards the end of the year had rendered great service to the Fund. On the donation account a sum of five guineas had been received, so that the amount uninvested had been increased to £47. This was kept with legacies, and under the regulations was invested as soon as it reached £100. There was an opportunity therefore for any one who wished to increase the invested funds to make up the donation account to £100 before the end of the year.

The report was unanimously adopted.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£5 to the widow (aged 60) of a registered chemist and druggist. Applicant, who has had four previous grants of like amount, is wholly dependent on her relatives. (Essex.)

£5 to the widow (aged 56) of a registered chemist and druggist. Four previous grants, amounting in all to £30, have been made in this case. Is unable to do much from chronic illness. (Cheshire.)

£10 to a registered chemist and druggist (aged 54) who has been bedridden for over a year. He had a similar grant last year. (Kent.)

Two cases had been deferred for further inquiries, and one had not been entertained.

The VICE-PRESIDENT (in committee) gave some detailed information with reference to one of the applications for assistance.

On resuming, he moved the adoption of the report and recommendations.

The PRESIDENT, in putting the motion, said he was perhaps somewhat responsible for the misapprehension which seemed to have arisen in some quarters with regard to what was said last month as to the mode of electing annuitants. The gentlemen who sat round the table took a deep interest in the welfare of their brethren, and were very anxious to save their feelings as much as possible when application had to be made for relief, and one of them at the last meeting said he hoped the time would come when some different form of electing annuitants might be adopted, one which in his judgment would be less trying and humiliating to the candidates than the present system. A conversation ensued, in the course of which several members expressed their views, and he himself stated that he should be very glad to see the day when the Council could elect the annuitants. It appeared, however, that this conversation had produced a misconception, some members having failed to notice that all the speakers were emphatic that the time had not yet come for any change; and he himself was very particular in stating that those who were in favour of the change should see that the income was about doubled before the scheme could be entertained. They were all mindful of the advantages arising from the present system, and did not contemplate any change. He mentioned this because he had seen some adverse criticism of a sort which seemed to show that those who criticized the proceedings had not read what was said.

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Library.

The report of the Librarian had been received, including the following particulars:—

Attendance.		Total.	Highest.	Lowest.	Average.
July	Day	509	29	6	19
	Evening	133	12	1	6
August	Day	92	7	0	4
September	Day	74	11	2	6

Circulation of books.	Town.	Country.	Total.	Carriage paid.
July	139	110	249	£1 6 0
August	46	53	99	13 10
September	59	93	152	1 3 2

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

For the Library in London—

Glasgow University, Calendar, 1889. From the UNIVERSITY.

University College, London, Calendar, 1889. From the COLLEGE.

University College, Dundee, Calendar, 1889. From the COLLEGE.

Yorkshire College, Calendar, 1889. From the COLLEGE.

City of London College, Calendar, 1889. From the COLLEGE.

St. Bartholomew's Hospital, Statistical tables of patients during 1888. From the HOSPITAL.

Institution of Civil Engineers, Charter, etc., 1889. From the SOCIETY.

Chemists' Assistants' Association, Proceedings, session 1888–89. 2 copies. From the ASSOCIATION.

Manchester Literary and Philosophical Society, Memoirs and Proceedings, 4th ser., vol. 2. From the SOCIETY.

Botanical Society, Edinburgh, Transactions and Proceedings, vol. xvii., pt. 2. From the SOCIETY.

Royal Dublin Society, Scientific Proceedings, new ser., vol. vi., pts. 3–6.

— Scientific Transactions, ser. 2, vol. iv., nos. 2–5. From the SOCIETY.

Royal Society of New South Wales, Journal and Proceedings, vol. xxii., pt. 2. From the SOCIETY.

Society of Chemical Industry, Address by the President, 1889. From the AUTHOR.

Berlu (J. J.), The Treasury of Drugs unlock'd, 1690. From Mr. EDWARD HORNER.

Butler (E.), Syllabus of Lessons on Arithmetic, 3rd ed., 1869. From the AUTHOR.

Curtman (C. O.), Lessons in Chemical Analysis, 3rd ed., 1889. From the AUTHOR.

U. S. Department of Agriculture, Bulletin no. 13, Foods and Food adulterants, part 4, Lard, 1889.

— Bulletin no. 21, Report of Experiments in the Manufacture of Sugar by Diffusion, 1889. From the DEPARTMENT.

Chicago College of Pharmacy, twenty-eighth announcement, 1889. From the COLLEGE.

Philadelphia College of Pharmacy Alumni Association, Annual report, 1889. From the ASSOCIATION.

Ephemeris, vol. 3, no. 4. From Dr. E. R. SQUIBB.

India, Revenue and Agricultural Department, Selections from the Records, by the Reporter on Economic Products, vol. 1, nos. 17–19; vol. 2, no. 1.
From H. M. SECRETARY OF STATE FOR INDIA.
Adrian, Étude historique sur les extraits pharmaceutiques, 1889. From the AUTHOR.
Figueroa (E. de), Le solenodon Cubanus, 1888.
Figueroa (D. de), Le lépidostée manjuari, 1888.
From Señorita doña D. DE FIGUEROA.
Goppelsroeder (F.), Über Capillaranalyse, 1889. 2 pamphlets.
— Farbelectrochemische Mittheilungen, 1889.
From the AUTHOR.
Smithsonian Report, 1886, part 1.
From the SMITHSONIAN INSTITUTION.

For the Library in Edinburgh—

Philadelphia College of Pharmacy Alumni Association, Annual report, 1889.
From the ASSOCIATION.
Ephemeris, vol. 3, no. 4. From Dr. E. R. SQUIBB.
Smithsonian Report, 1886, part 1.
From the SMITHSONIAN INSTITUTION.

The Committee had recommended that the undermentioned books be purchased:—

For the Library in London—

Beilstein's Organische Chemie, 1886–89.
Bernthsen's Organic Chemistry, 1889.
Watts' Inorganic Chemistry, 1889.
Groves and Thorp's Chemical Technology, 1889.
Wall's Dictionary of Photography.
Haydn's Dictionary of Dates, 1889.
The Secretes of Alexis, 1562.

For the Library in Edinburgh—

Pharmaceutical Journal, 48 vols. bound.
Edinburgh Pharmacopœia, 1735.

A letter from the Secretary of the "Mathematisch-naturwissenschaftliche Classe der Kaiserliche Akademie der Wissenschaften in Wien," agreeing to exchange publications with the Society, had been received, and the exchange approved.

The Librarian had reported that at the recent examination of the Library the undermentioned books were missing:—

Bentley's Organic Materia Medica.
Oliver's Elementary Botany.
Remsen's Organic Chemistry.

The Librarian had presented his report of the annual meeting of the Library Association held in London in October.

Museum.

The Curator's report had been received, and included the following particulars:—

Attendance.		Total.	Highest	Lowest.	Average.
July	Morning	553	38	5	20
	Evening	83	9	1	3

August, 96; September, 122.

The following donations had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimen of Biennial Henbane.
From Messrs. H. M. and R. USHER, Banbury.
Two specimens of exalgine in fine crystals.
From Messrs. BRIGONNET and NAVILLE, Paris.
Specimen of *Cryptocoryne spiralis*.
From Mr. D. HOOPER, Ootacamund.
Specimen of Strophanthus pod.
From Dr. R. BLONDEL, Paris.
Specimens of Cascara Sagrada bark from Northern Oregon, from Southern Oregon, and from Seattle, Washington Territory.
Salt pseudomorphs from the cutting of the Manchester Ship Canal at Warburton.
From Messrs. KAY BROTHERS, LIMITED, Stockport.
Specimen of *Swertia angustifolia* and volatile oil of *Pandanus odoratissimus*.
Six specimens of the Lignum Aloes wood of Eastern commerce and thirteen microslides illustrating their structure, etc.
Three microslides illustrating the odoriferous glands of the bracts of *Pandanus odoratissimus* and five microslides illustrating the structure and secretion of the bark of *Boswellia Bhau Dajiana*.
Specimens of the plants of *Andropogon muricatus* and *A. Schœnanthus*; and fruits of *Tetranthera citrata*.
From Professor Van EEDEN, Haarlem.
Specimens of the berries of *Kraussea coriacea*.
From Mr. J. MEDLEY WOOD, Durban Botanic Gardens, Natal.
Specimens of crude and recrystallized sugar from ipecacuanha. From Mr. J. O. BRAITHWAITE.

The following donations to the Museum in Edinburgh were reported.

Flowering branch of *Rhamnus Purshianus*.
From Mr. PETER MACEWAN, F.C.S.
Two flowering specimens of *Hyoscyamus niger*.
From Mr. THOMAS FAIRGRIEVE.

The Staff of the Society's School had attended and reported on their respective classes.

Mr. SCHACHT asked if the number of applications for books from the country was at all on the increase. He should like to know whether that branch of the Society's operations was successful.

The PRESIDENT said his impression was that it was successful, but he could not give the actual figures at the moment. He did not know that there was a continuous annual increase; it varied somewhat, but since the new regulations had been made, the number of books sent to the country had enormously increased. It had been found necessary to buy duplicate copies of reference books in order to have one set always in the Library, and one set to lend; such books for example as Watts's 'Dictionary,' 'Gmelin,' and so on. During the last three or four years nearly all reference books had been duplicated for this purpose.

Mr. SCHACHT said he mentioned the matter in order to draw attention to the fact that the Society possessed a splendid library which was very easy of access to all members.

Mr. NEWSHOLME asked if the Council could see its way to pay the carriage of books to country readers both ways? It would be a great boon to apprentices and assistants who had not much money to spare.

The PRESIDENT said the fact was that a great many persons in the country got books through the carriers with whom they had contracts, and thus did not have to pay any carriage, but, of course, an apprentice who sent for a book direct would have to pay. The Society did not spend very much on the carriage of books, and possibly the present system might occasionally prevent an apprentice or assistant obtaining a book, and he would undertake to bring the question before the Committee.

Mr. NEWSHOLME said that occasionally people in his town came to him to get books through Sutton; but it was not, he thought, desirable to rely on that means entirely.

Mr. SOUTHALL asked if there was not a library in Sheffield.

Mr. NEWSHOLME said there was a library, but it was not at all like that in Bloomsbury Square.

The PRESIDENT remarked that it could not be expected that every town should possess such a library as that of the Society.

Mr. ATKINS said Sheffield had a very nice nucleus of a library, to which one member of the Council had contributed very handsomely, and perhaps others might do the same. It would not be a very gracious thing, perhaps, to present worn out volumes to the country libraries, but if there were any surplus works which could be spared to the Sheffield or other local libraries he should like to put in a word for them.

Mr. SOUTHALL imagined that the state of things at Sheffield was something similar to that at Birmingham, where there was a library quite sufficient for the ordinary wants of apprentices. There might be an exception occasionally, but very rarely.

Mr. CROSS asked if they had several copies of each work at Birmingham.

Mr. SOUTHALL said that was so in some cases. He referred, not to the public library, but to that of the Chemists' Association.

The PRESIDENT said it should be borne in mind that all those who entered the business should be prepared not only to get the requisite knowledge, but also to pay for it to a certain extent. Whilst disposed to do all he could for everybody, he did not think the Society was bound to provide common textbooks, which every one ought to provide for himself. There was a tendency amongst some to want to borrow the latest editions of every elementary work on chemistry or botany, but he thought every apprentice ought to buy books of that kind for himself, because he could not really do his work properly without. With regard to those who were more advanced and wanted to refer to larger works, Mr. Newsholme's suggestion deserved consideration. He felt more and more the difficulty in the way of apprentices who had mastered the elementary books, and wanted special information from larger books, such as Miller, Armstrong, or some other work on organic chemistry. These books were continually getting antiquated, new editions were coming out, and it was very costly for any one to keep up with either chemical or botanical science. These books ought to be lent with the greatest possible facility, but elementary books, such as were often asked for both there and in Edinburgh, he did not see that the Society was called upon to provide.

Mr. SCHACHT thought the proper course would be to continue to make the library, as it had been in the past, a thoroughly good one, illustrative of the sciences connected with pharmacy, and the Council should not look so much to provide for the wants of apprentices as to the wants of their own members, whose own libraries would naturally be deficient in the more important works which were continually coming out. What was really wanted in a reference library was books which would give exact information on minute points; such information as would only be found in some special memoir. He thought the library would be more used if principals and advanced students remembered that they would be pretty sure to find what they wanted there. He had sent up twice for a book and been informed by the Librarian that the book was out, and that he would have to wait, and in the case of such books it would be well to have two or three copies.

The PRESIDENT said since he had been President he had impressed on his colleagues the importance of having at least two complete copies of important books of reference, so that one being out, the other might always be in. Very often a man came up from the country to make a reference to a particular work, and it was very aggravating not to find it. Indeed, in the case of certain books it was a question whether there should not be more than two copies. He was quite prepared to submit Mr. Newsholme's suggestion to the Committee, but while he would willingly recommend an increase in the number of copies of what might be called, in the largest sense works of reference, he should object to make the library either there or in Edinburgh a collection of copies of Attfield's chemistry and so on to be distributed to the students.

Mr. RICHARDSON asked if the works of reference were ever sent out.

The PRESIDENT said yes, when there were duplicates; some could not be duplicated, and they were not sent out; but of important books sets had been purchased, and one was always in the library, while the other could be borrowed.

Mr. SCHACHT said the book he wanted to borrow was Lothar Meyer's 'Chemistry' soon after it was purchased. In one respect he was glad to find that he had been anticipated, and that the book was out. In that case he presumed there were two copies. He could not get it for some weeks.

Mr. MARTINDALE observed that it would add to the usefulness of the library and the convenience of members if they would make a point of returning a book as soon as done with. As to the utility of the library to country members he thought it was the desire of the Council to give as much help as possible; the question of paying carriage both ways might be considered, but it was a great help to have it paid one way.

The PRESIDENT said when a new book of importance came out, everybody wanted to see it, and even if a dozen copies were bought there would be a run upon it for a time.

The VICE-PRESIDENT hoped before the matter was remitted to the Committee that members would express their opinion on the question of carriage both ways. His own opinion was strongly against it. Not only young men but old ones also appreciated that which cost them something much more than what they got for nothing. It was essential that some member of the Society should be responsible for books obtained by the juniors, and if a principal were applied to by a member of his staff there was hardly one who would hesitate to be responsible, and in nineteen cases out of twenty the carriage would cost nothing, as most of them had a contract for the carriage of small parcels. If the Society were to pay the carriage it would be so much extra expense, with very little advantage to anybody. He was disposed to give every facility for assistants and apprentices getting books, bnt did not think any appreciable advantage would be gained by this proposal, whic would probably cost much more than was expected.

Mr. MARTIN said he had the greatest sympathy with Mr. Newsholme's suggestion for offering facilities to apprentices, but to those who were really in earnest it was not a very serious matter to pay carriage one way, and if it were paid both ways and the books were delivered there would be some slight temptation to send for books merely out of curiosity, thus putting the Society to expense without any real benefit to the borrower. He knew there was a feeling that country members could not make so much use of the library and other advantages of the Society as those in London, but he would point out that the so-called London members mostly lived a long way from the Square, and had to pay 'bus fare both ways and spend a good deal of time in going backward and forward to consult the books. If a man, by simply writing a postcard, could get a book delivered without any trouble or loss of time, he would be in a better position than a London member. The parcel post was very cheap, and he thought it should be paid one way by the borrower, as a guarantee that he really wanted the book he sent for.

Mr. HILLS was heartily in accord with the views expressed by the Vice-President. People prized most what cost them something. If this change were in-

troduced people in the suburbs would probably save their time and omnibus fares and send for their books at the expense of the Society.

Mr. RICHARDSON said there were a good many libraries about the country connected with pharmacy, and he thought if the authors of new books were approached in the right way they would very often present copies.

Mr. NEWSHOLME said he was not on the Library Committee and should not have an opportunity of expressing his views on this point there. He did not think the majority of country chemists had contracts with Sutton for carriage such as the Vice-President referred to. The argument seemed to have turned mostly on the question of principals or masters obtaining books; he did not object to them paying half the carriage, or even the whole, but the class he was principally concerned about was that of the apprentices connected with the Society. They paid half-a-guinea a year, for which they no doubt got full value, but it was to the interest of the Society to do everything to get hold of these young men, and if paying the carriage of books were the means of inducing more to join the Society he thought it would be a very wise expenditure. Last year there had been a considerable increase in the number of these apprentices in Sheffield, and this matter had been brought before him once or twice. He quite agreed that the London men had no advantage in this respect, perhaps the reverse, but that was no reason why every inducement should not be offered to young men to join the Society.

Mr. GOSTLING was entirely in sympathy with the Vice-President. The small amount of self-sacrifice required from the students would tend to make them value the books more and would do them good. There might be exceptional cases in which a studious youth was under very disadvantageous circumstances, and there probably the Committee would be willing to make an exception, but as a general rule he thought the present practice was quite liberal enough.

The PRESIDENT said no doubt the Committee after this discussion would be able to arrive at a satisfactory conclusion on the matter. He now moved the adoption of the report, and in doing so would mention that Professor Planchon had presented several volumes to the library, and in doing so wrote in a very enthusiastic manner as to the kind reception which he had received from the officers of the Society in London, which he said had rendered his visit "un véritable enchantement."

The motion was at once agreed to.

DIVISIONAL SECRETARY FOR EAST MARYLEBONE.

The PRESIDENT said Mr. Martindale, having now become a member of the Council, had thought it better to resign his position as divisional secretary, but he had looked round and was prepared to move the appointment as his successor of Mr. Richard Thomas, 13, Upper Baker Street, a pharmaceutical chemist, and one who was likely to interest himself a good deal in the work of the Society. He believed he would fill the office very satisfactorily.

Mr. GREENISH seconded the motion, which was carried unanimously.

THE DUNDEE CHEMISTS' ASSISTANTS' AND APPRENTICES ASSOCIATION.

The PRESIDENT said an application had been received from the Honorary Secretary of this Association asking for some assistance in the shape of books. The application was not in the usual form, and the information was by no means ample, and he would suggest that it be referred to the Library Committee.

Mr. SCHACHT asked if it was exclusively an assistants' association.

The PRESIDENT said it was clear that pharmaceutical chemists were assisting it as honorary members.

Mr. NEWSHOLME said that if the majority of the members of the Association were connected with the Society it would be advisable to entertain the application favourably.

The PRESIDENT understood there was only one member of the Association who was connected with the Society, but that was not the sole ground for giving assistance if good educational work was being carried on.

The application was referred to the Library Committee.

REPORT OF EXAMINATIONS.

October, 1889.

ENGLAND AND WALES.

	Candidates. Examined.	Passed.	Failed.
Major (16th)	6	3	3
,, (17th)	6	4	2
,, (23rd)	6	4	2
,, (24th)	6	2	4
	—24	—13	—11
Minor (16th)	27	13	13
,, (17th)	25	9	16
,, (18th)	31	12	19
,, (23rd)	28	7	21
,, (24th)	24	9	15
	—135	—51	— 84
	159	64	95

SCOTLAND.

	Candidates. Examined.	Passed.	Failed.
Major (16th)	2	1	1
Minor (16th)	10	5	5
,, (17th)	14	6	8
,, (24th)	14	11	3
,, (25th)	14	9	5
	—52	—31	—21
Modified (16th)	1	1	0
	55	33	22

Preliminary Examination.

8th.—Candidates, 242. Passed 112. Failed 130.

24th.—8 Certificates by approved examining bodies were accepted in lieu of the Society's examination.

RAILWAY RATES.

The PRESIDENT reported that he had attended the Inquiry into Railway Rates on October 29, but the Society being petitioners, not objectors, his name was not formally entered as appearing on behalf of the Society. They had all probably gathered from the press that the inquiry would take a long time, and if it should be necessary before the conclusion for him to appear, he should be happy to do so, but his impression from the information he had obtained was that most of the details which affected their trade would be adjusted in a friendly way. The great fight would be with regard to interests much greater than those of chemists and druggists, whose carrying trade from a railway company's point of view was very small. When he spoke to a railway man about empties he smiled, and said the empties they had to consider were those big enough to fill a waggon, such as empty pianoforte cases, coming back from the north. They had to devise rules to meet such cases as that, and the maximum rates were never intended to apply to small matters. The question of terminals was very important, and if the railway companies were not able to agree with the objectors, it was quite possible there would be further legislation. The great point was that the railway commission was fixing a maximum rate which would apply to all companies in future, and which was higher than the existing rate,

and as they said would probably always be higher than the existing rate; but inasmuch as it was desirable that all railway companies should charge on the same general scale, so that every trader might know what certain classes of goods would cost, it was necessary to have a maximum scale. It might be necessary to charge a little more in one district than another, on account of special circumstances; for instance, in some places sheds required to be built to accommodate the goods. The great difficulty was in the classification, but as far as he could gather, there was a disposition on the part of the companies to arrange terms as far as possible; in fact a fresh schedule had already been issued by London and North Western Railway Company.

Mr. ATKINS said no doubt the chief difficulty lay in the classification. He presumed the wholesale houses would, to a great extent, protect the interests of the retailers by defining what the classification meant. He could give some most absurd illustrations of what had occurred through want of technical knowledge on the part of the railway companies.

Mr. SOUTHALL thought wherever there was competition the traders would be all right, but where that was absent the higher rates would rule.

The PRESIDENT said that was just the point. The notion of the companies was that Parliament had authorised them to charge a maximum rate, and that where the carriage of a particular class of goods would involve them in a loss it would be hard to compel them to carry those goods at the existing rate. They also laid stress on the fact that it was their interest to carry as much as possible, and so be on good terms with their customers.

Mr. GOSTLING hoped they would get not only a better classification, but a reduction in the maximum, but the companies were very loth to alter their charges. There was one class of goods in which he dealt largely, and he had endeavoured to get the Great Eastern Railway Company to modify existing terms so that he might get it all by rail instead of partially by water, but he could not move the company at all.

The PRESIDENT said that brought up another question about which there was a good deal of misconception. It was held by the railway companies that traders had no real grievance with regard to a charge until it was made. What the Act prescribed was that there should be maximum and minimum schedules; that the tribunal now sitting was only formed for the consideration of those schedules and the question of terminals, and that the question of actual charges could not come before it. If, for example, under the schedules drugs were charged higher than the existing rates, those who were aggrieved could go before a court specially constituted for the purpose, and the Commission could order the rate to be reduced to what it was before, or even lower if good cause were shown. This was important because some of the objectors confused the schedules with the actual rates. If the companies fixed the rates above those now in use the traders could go to the Commission and ask for a reduction.

Mr. RICHARDSON said, very few would dare to fight a rich railway company; they would prefer to pay what was imposed. The fight would have to take place on the schedules.

The PRESIDENT said the position taken was that this inquiry had nothing to do with the actual charges, but only with the schedule of rates. Then when the schedule was obtained, if the company increased the charge on any class of goods beyond what it now was, those who imagined they were injured could go before the Railway Commission with a complaint.

Mr. SOUTHALL: If they were strong enough.

The VICE-PRESIDENT: Would it not be easier to go before a County Court Judge?

The PRESIDENT said that the Railway Commission had equitable powers. The maximum rate mentioned in the schedule was a good deal higher than the existing rates, but the companies said they did not propose to charge the maximum, but if they did the traders could appeal to the Railway Commission.

Mr. MARTINDALE remarked that the class of goods which most affected retail chemists were what were called "smalls," and it was a curious thing that such articles came from Germany at less cost than from Yorkshire. This formed an important item of a chemist's expenditure, but the parcels post had done a good deal for them; it had swept away a good deal of the railway company's traffic in "smalls," perhaps to their advantage, because they did not want to be bothered with it.

Mr. ATKINS said the question of empties was very important, and to chemists in the country who had anything like a business carriage was quite a rental. In his own business he was amazed at what they had to pay under this head. A few years ago they had merely an entry charge for empties, but now it was a charge by weight. He had a small interest in a London company, which he should certainly do some business with if he could, and if he only had the carriage of the goods to pay for he might do so, but the carriage back of empties rendered it impossible.

The PRESIDENT said as far as he could gather the great difficulty arose in the classification. The railway companies had to devise a system which should apply to every railway company in the kingdom, and he could feel for those who had such a task to perform. For instance, one striking absurdity was that empty bottles which had been used were charged more than a similar weight of new ones. That was, they came in a different class. On these points some modifications had already been made by the London and North Western Company, and in opening the case for that company, Mr. Pope, Q.C., said he trusted that the negotiations with traders would go on privately, and that they might be able to arrange classification charges which would be satisfactory to both sides.

GENERAL PURPOSES COMMITTEE.

The Report of this Committee included the usual letter from the Solicitor as to the progress of cases placed in his hands.

Several cases of alleged infringement of the Pharmacy Acts were considered by the Committee and proceedings recommended.

The Committee had also considered some alterations in the notices to superintendents and candidates for the Preliminary, suggested by the College of Preceptors, and recommended their adoption.

The Council went into committee to receive and consider this report. On resuming it was unanimously agreed to.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the above Association was held at the rooms, Great Russell Street, on Thursday, October 31, the President, Mr. Ellwood, in the chair. The following paper was read on—

PHOTOMICROGRAPHY.

BY M. E. SWAN.

The subject of the present paper is one which I believe will be of greater or less interest to all present, and is also one in which though practically only a beginner myself I trust to be able to show how comparatively simple and inexpensive are most of the processes involved.

All who use the microscope — and amongst such

must fairly be included the student of pharmacy who at those trying interviews with certain veteran pharmacists at "No. 17" is expected to recognize plants and organs of plants displayed under the microscope—all who use the microscope must at times have felt the desire to possess a faithful delineation of some of the objects (unique it may be in some cases) coming under examination, and specially when it is desired to show the feature of some minute object to a roomful of people at once, without requiring each one to advance to a table and take a perfunctory peep down the tube of the microscope.

This can be done, you say, by a diagram, but not every one is sufficiently facile with pencil or brush to make such a success, while I shall hope to show you that such can be converted into a lantern slide suitable for a demonstration at a trifling outlay of time and material.

Photomicrography is the newer title of the art which used more generally to be known as microphotography, but the latter name is now almost exclusively applied to the production of those beautiful little photographs of pictures, etc., which Mr. Dancer makes for examination with the lower powers of the microscope.

The art, however, with which we are concerned, namely, that of making enlarged pictures of minute objects is simple, and that it may be cheap is self-evident from the nature of the apparatus before you and with which I generally work.

The essential apparatus are, a microscope, which I assume you all possess; this is preferably one having a short and wide body, a camera of the simplest construction, together with a few dishes and reagents.

It is an advantage to have an adjustable base board on which to set up the apparatus, but even this is not absolutely essential.

The camera can be made by any amateur joiner out of any light case, such as a soap box, at a cost of next to nothing, the only part necessary to purchase being a back, as it is called, and the cheapest form I know is Lancaster's metal double back, which will carry two plates $3\frac{1}{4} \times 4\frac{1}{4}$ back to back and costing about 2*s.* 6*d.*

A dark room is necessary to work in, but at night time there are generally but few difficulties in the way of the photographer, and a little ingenuity will generally succeed in darkening any ordinarily lighter room even in daytime. My own work room is rendered suitable for photography in less than ten seconds by lifting a canvas and paper screen into the window space and securing it there by two turn buttons. This screen has a square hole containing a sliding piece of ruby glass, which was the most expensive part of the whole thing, which did not cost two shillings to make. A connection must be made to adapt the tube of the microscope to the lens hole of the camera, but even this may be dispensed with and a black cloth used to stop any stray light entering.

The light may be either daylight or artificial, and the latter, except under certain circumstances, is generally preferable, being more manageable, and further, as most of my own work is done at night, is absolutely necessary. A paraffin lamp is all that is needed to supply the light, and if a flat frame is used the edge of the flame should be used as the source. The bull's eye condenser is used so that a bright image of the flame is focussed on the object, and the camera being in position the object is focussed on the ground glass of the camera.

A velvet lining tube should be inserted into the body of the microscope to prevent central flare. A good "fine adjustment" to the microscope is desirable, one that acts readily and accurately both in approaching and withdrawing from the object, and if its movement is truly in the optical axis of the instrument (which unfortunately is very rarely the case), so much the better when photographing different objects which do not lie all in one plane.

The focussing screen now demands attention; ordinary ground-glass is too coarse, except for very rough focussing. An improvement is to varnish a sheet of plain glass with an ethereal solution of sandarac, which dries with a very fine smooth surface. A still better screen is a polished glass plate with a few lines ruled on it. The image on such a screen is invisible to the eye alone, but may be viewed with a lens, and when the image and the lines on the glass both appear equally sharp the best focus has been obtained.

Perhaps the best method is to have a wooden screen perforated with holes, into which a spare eyepiece is slipped to such a depth that the diaphragm coincides with the plane in which the plate lies in the "back," or, in other words, with the ground surface of the ordinary screen. With such an arrangement, or a modification of it, it is easy to obtain sharp definition with so high a power that the image would be absolutely invisible on the ordinary screen, owing to the loss of light and amplification.

The time of exposure will vary with the intensity of the source of light, colour and density of the object, sensitiveness of the plate, and the magnification of the object. By using plates of one degree of sensitiveness and always using the light as nearly as possible under the same conditions, two of these variables can be eliminated, and by remembering that roughly the time varies as the square of the linear amplification, an idea can be formed of the proper exposure.

It would be highly desirable that some standard should be arrived at, but the difficulty of determining a standard of light has not yet been fully overcome.

The nearest approach to any refinement of the kind is that described in a 'Manual of Photomicrography,' by Dr. Bousfield, and involves the use of Warnerke's sensitometer screen.

This screen, which consists of a series of spaces numbered from one to twenty-four, containing smoke-coloured tissues of regularly increasing density, by application to the focussing screen, affords a guide to the intensity of light falling on it; and the method of use is to read the last number visible, and knowing the rapidity of the plates in use, refer to a table which has been deduced from a number of experiments.

In colour experience alone must guide, reds and yellows, as a rule, are favourable to photography, while blue and violet, which are transparent to the actinic rays, are difficult to obtain satisfactory negatives from.

As an example of the variation in exposures, I have photographed an object with a 2-inch objective, giving about 25 diameters on the screen, allowing only two seconds, and obtaining fair density, while with a $\frac{1}{8}$-inch, and extending the camera so as to obtain about 800 diameters, I have allowed half an hour, and then found the plate somewhat under exposed.

Any of the well-known brands of plate may be used, either ordinary speed or rapid, but there is no advantage in the use of rapid plates with low powers, say up to $\frac{1}{2}$ an inch; after that, exposures begin to become tedious, even with rapid plates, so much so that anyone doing much work requiring high powers would have to obtain an illuminating source of higher actinic power, such as the electric arc or oxyhydrogen lime light.

Magnesium can also be used, but is rather costly, and there is much difficulty in dealing with the smoke from it and in keeping the glowing point accurately in the focus of the condenser.

Sunlight has even been used with success by Dr. Woodward in America, and with the heliostat to obtain a constant beam good definition has been obtained up to 5000 diameters.

The exposure made, the plate is taken into the dark room and there developed. As most present will be familiar with this part of the process, I will only

briefly review it for the benefit of those who are not acquainted with the details.

The plate, which is a square of glass coated with gelatine, holding in suspension various haloid salts of silver, is after exposure to all appearance the same as it was before, but a subtle change has taken place, for now all those parts of the plate upon which light has fallen during exposure are now highly sensitive to the action of certain reducing agents, many of which might be employed, but practically we have to choose between three processes, viz., ferrous oxalate, pyrogallol and quinol.

The developer is poured on to the plate, and the latter is watched in a "safe" light until the image has well appeared and shows well through the back, which if all has gone right should be in two or three minutes; the plate is then washed in two or three changes of water and fixed in thiosulphate of soda or "hypo," as it is more commonly called.

This "hypo" dissolves out of the film all the unchanged salts of silver, but leaves untouched that part that has been blackened or reduced by the developer.

The fixing bath should be allowed to act for fully ten minutes, in order to completely remove all unreduced silver from the film, and then must be subjected to a prolonged washing in running water till all traces of the salt is removed, or the negative will inevitably deteriorate.

The negative is now allowed to dry spontaneously, and if valuable may be varnished to preserve it; but this is not absolutely necessary, as it does not improve the printing qualities, and with ordinary care the plate does not suffer any injury in printing.

Printing may be effected on ordinary sensitized albumen paper by daylight, but if the opportunities for printing only occur at night, bromide paper may be used.

The surface of bromide papers resembles that of the plates used for the negatives, and good contact prints may be made by gas or lamplight, which must be developed in exactly the same way as the plates, viz., with ferrous oxalate or quinol, pyrogallol as a rule not being so well adapted for paper development.

Lantern transparencies can be produced in exactly the same way on gelatine coated plates, either by contact printing or the use of camera and lens.

The preparation of a negative and print must close my remarks to you, and I can only express the hope that some of you who have not yet attempted this fascinating art may feel stirred to make a beginning.

The author demonstrated his practical acquaintance with his subject by conducting the process through its successive stages before the members. The negatives he obtained were remarkably clear, and exhibited in a high degree the progress that has taken place in the photographic development of microscopic objects.

Mr. Ellwood (the President) said the paper implied a knowledge both of microscopy and of photography. As pharmacists, they were necessarily acquainted with the microscope, and many of them took more than a passive interest in photography. He said that in consequence of repeated inquiries for information on the subject of photomicrography, Mr. Shenstone had contributed to the *Pharmaceutical Journal* ([3], vol. xix., p. 802) a sketch and description of apparatus that he had employed. Mr. Swan's idea in using an eyepiece he thought was an improvement upon the suggestion of Mr. Shenstone to employ zinc tubes. The difficulty of the process seemed to lie in the somewhat arbitrary fashion in which they regulated the time of exposure. He thought some idea of the amount of light that was required to produce a particular negative might be determined by using a Crooke's radiometer, as had been suggested by a French experimenter.

Mr. Smorthwaite, as a practical photographer, paid a high compliment to Mr. Swan for the skill he had shown in obtaining such excellent results under circumstances which were, to say the least, disadvantageous. With reference to the apparatus itself, dealers in photographic materials had not overlooked the question of photomicrography, and Messrs. Mawson and Son suggested that the object glass might replace the microscope altogether, whilst Robinson's small camera might be fitted on to the microscope. The most common cause of failure was the difference which existed even in a good objective between the chemical and the optical focus, and when this was appreciable it was almost impossible to get sharp and satisfactory pictures. It was impossible to use Crooke's radiometer in an ordinary room for estimating the amount of light that might be necessary to produce the negatives, because it was so sensitive to heat rays, and the simple presence of the operator would render the observations inaccurate and unreliable. He did not altogether agree with the varnished glass for focussing; if the ordinary plate of ground-glass were carefully washed, dried and rubbed over with oil it formed a most excellent screen for obtaining the proper focus.

Mr. Smith made some inquiries respecting the use of certain stains.

Mr. Richards referred to the "pin holes" which so frequently disfigured photographic prints, and asked if the author had had any experience in the use of "meta-bisulphates," which in the hands of some operators seemed to develope a green fog.

In replying Mr. Swan confirmed the statement of Mr. Smorthwaite with reference to the unsuitableness of Crooke's radiometer as a measure of the light used —remarking that that instrument was quite as much affected by heat as it was by light. He again alluded to the Warnerke sensitometer screen, which he had described in his paper, and said that it was available as a photometer. One of the advantages connected with the shortened apparatus which he employed, was that the fine adjustment was within easy reach of the operator. The lengthened tubes of Messrs. Barker's apparatus, for example, necessitated the employment of a rod and pulley connection with the fine adjustment. Mention having been made of the connection often necessary in the case of over or under connected lenses in order to obtain the true actinic focus, the author remarked that the objective then in use, a two inch, appeared to give the test negative when at its true visual focus, but with his $\frac{1}{4}$ inch his plan was, after getting the sharpest possible focus, to withdraw the objective from the stage by a distance which was represented by $\frac{1}{4}$th to $\frac{1}{6}$th of a turn of the mill-head. In referring to the use of an oiled screen to receive the image, he then showed an image of an insect preparation on a screen which had been rubbed with vaseline, but enforced his previous remark that the sharpest focus was to be obtained by the use of a spare eyepiece and a perforated screen, and showed a modification of this, in which the screen was replaced by a narrow slip of wood, perforated with one hole to receive an eyepiece to the proper depth, and which enabled it to be moved to all parts of the image, and not merely to certain fixed points, as in the square perforated screen. The staining fluids used in the micro-preparations were next referred to. Eosin (blue shade) appeared to be the most awkward to deal with; the use of a screen of signal-green glass being advocated together with a prolonged exposure. The effect of the screen was to produce neutral tints with eosin-stained preparations. With logwood single stained preparations he had not experienced any great difficulty. In reply to Mr. Richards the author explained that he always brushed the plates in water with a flat camel's-hair brush to avoid air bubbles, which sometimes adhered to the plate with great persistence, and which were, unless removed before development, a

fruitful source of pinholes. He possessed no experience in the use of "meta-bisulphate," though he knew sulphite to be an excellent preservative.

A vote of thanks was proposed to the author by Mr. Blackham, and seconded by Mr. F. Ashley Rogers.

Mr. Swan, in acknowledging the compliment, concluded by expressing a hope that his efforts to explain a process, which at first sight appeared complicated and difficult, but which in reality was simple and inexpensive, might encourage some of those present to give it a trial.

Provincial Transactions.

NORTH OF ENGLAND PHARMACEUTICAL ASSOCIATION.

The annual meeting was held in the University of Durham College of Science on Thursday, October 31, Mr. N. H. Martin, F.L.S., etc., in the chair.

Report of the Council.

To the members and associates of the North of England Pharmaceutical Association—

The Council has to report that since the last annual meeting the rooms at St. Nicholas Chambers have been given up, and that the Association is now permanently located in the buildings of the Durham College of Science.

The Association now numbers 49 members and 30 associates, and the library contains 199 volumes, having been enriched by the gift of books from the Pharmaceutical Conference.

In the last session there were seven students who attended the lectures on chemistry and five worked in the laboratory. One of our students obtained the prize in chemistry. The botanical lectures were attended by twelve students. There were no lectures on materia medica and pharmacy, partly because the entries were small, but in the case of materia medica also in part because of our removal from St. Nicholas Chambers to this room having given the honorary curator (who is also the lecturer on materia medica) so much extra work that it was felt to be too much to ask him to lecture to a very small class.

Although our Association did not officially take part in the entertainment of the Pharmaceutical Conference which has recently visited us (this duty being undertaken by a separate local committee), yet our position in connection with the college rendered it easy to obtain and to place at the disposal of the Conference all the facilities which they required for their business and pleasure.

In conclusion the Council hopes to maintain the Library and Museum in their present state of efficiency, and to continue to provide the means of education for the young men of the district who wish to become pharmacists, and it is to be hoped that each year will show a growing appreciation of the advantages which our Association has provided.

The report of the Treasurer was then read, and showed that the Association was financially in a very satisfactory position.

On the motion of the President seconded by Mr. T. M. Clague the reports were adopted.

The Certificates of attendance upon the Botany Class in the last Session were distributed.

The President's Address.

Gentlemen,—If you will direct your thoughts back over the literature of the past forty-eight years, since the establishment of the Pharmaceutical Society, and remember how many addresses have been written and delivered, and upon what a variety of topics, more or less bearing upon pharmacy, you will agree with me that I may well be excused for a feeling of discouragement that the Rules of our Association demand that I, for the third time, shall attempt to give you an address. This feeling does not, however, arise entirely from the fact that the ground has been so amply cultivated; that men, whose names adorn pharmacy, as well as science, have in their turn spoken and written; or that I may not hope to add a single mite, by way of instruction, to what has already been said. But it finds its chief cause in the feeling of hopelessness that it is all of no use, that men may preach and pray, but those into whose hands are committed the practice of the art and calling of pharmacy will go on their own way, and that a way not altogether in the direction of the elevation of their calling.

Before I proceed to any other topic, I think this may be a convenient time and place to briefly review our history as an Association, to recall the object with which we set out, and to see to what extent we have succeeded; and where we have failed to realize those hopeful aspirations which many of us shared at the commencement.

The first circular issued was dated March 25, 1885, and by it the chemists of the district were invited to meet together "to take into consideration the desirability and feasibility of establishing a Local Association of Chemists, which may take action with a view to provide for the North of England the means of education in pharmacy and the kindred subjects required by the examinations of the Pharmaceutical Society." This circular was signed by the Local Secretaries of the Pharmaceutical Society for Newcastle, Sunderland, South Shields and Durham.

The first meeting was held and several subsequent ones, which I need not take you through in detail. At these meetings suggestions of various kinds were made as to what should be the objects, and what the scope of our Association; but in the outcome, the Association was formed upon the very definite platform of "the establishment of suitable facilities for pharmaceutical education in the district;" and it is from that point of view that I wish to direct your attention to what has been done.

The four absolutely essential requirements in education are rooms, teachers, books and specimens. Rooms were soon obtained in St. Nicholas Chambers, and for three years, from July, 1885 to July, 1888, we had possession of two rooms, which, although small, were admirably suited for the requirements of our Library and Museum; and for the delivery of such of our lectures as were best given in contiguity to our Museum.

The means at our disposal and the fees which we could reasonably demand from our students, rendered it impossible for us to go far afield for our teachers; but with regard to the very important subject of chemistry, theoretical and practical, the interest taken in our work from the first by the Durham College of Science, and the assistance which we received from the Principal of the College and the Professor of Chemistry, enabled us to provide for efficient instruction in chemistry without making any demands on our resources to establish and equip a laboratory of our own.

With regard to the other subjects, we also found in Newcastle men who were able and willing to deliver courses of lectures on botany, materia medica and pharmacy.

By the liberality of several donors (a list of whom is given in the report of our first annual meeting), and by a very substantial grant from the Pharmaceutical Society, we were enabled to acquire a good library of the standard works of pharmacy, and a useful museum of materia medica specimens, and to purchase suitable cases and bottles, so that books and specimens might

be properly taken care of and rendered available to the pharmaceutical students of the district now and hereafter.

In the four essentials of pharmaceutical education it was not long before our School of Pharmacy was fully equipped. The result has been that chemistry and botany have been taught in every session since our commencement, and we have had two complete courses of materia medica and pharmacy.

In 1887 the ardour of some members of our Association began to cool, and resignations were by no means uncommon, so that by the end of that year and in the beginning of 1888 the outlook was not altogether a reassuring one for those who had borne the heat and burden of establishing the Association, and who were still loyal to it. It was felt that very soon the question of whether or not the Association could continue, with its annual expenditure and its few contributors, would have to be answered. At that crisis the great benefit that we had derived from our connection with the College was made apparent, and the Council of the Association was enabled to negotiate with the College authorities terms upon which we were admitted to a home in this building, and to a share in all the privileges which it entails, without being saddled ourselves with a burden greater than, if need be, a few of us can very comfortably bear.

As an Association, I think we may congratulate ourselves that the past four years have not been wasted, and that we have accomplished the very modest task with which we commenced our existence. We may feel assured also that there is an element of permanence about our work which will make what we have done a factor in the future education of pharmacists in this district, whether that education remains voluntary as now, or is rendered compulsory by any future legislation.

In contemplating where and how we may be considered to have failed, I do not think we can be said to have done so because our evening meetings and the contribution of papers to our Association have been few. It was not a part of our programme to add our contribution of mere words to the stream of more or less uncertain value which is being poured out. For my part, I think that so far from its being a sign of weakness, or of failure, I congratulate my fellow members that they have had the courage to resist the temptation to read papers, unless they had something which it was worth while to record in a permanent form. Nevertheless, we have been in the past and we shall in the future, be glad to welcome any member to read a paper upon any original work, if he chooses to make our Society the medium of its communication.

We have not had as many students as we should have liked, but in this, too, we have not failed, because this was a thing we did not, and could not, set before ourselves as an object that we could control. The supply of educational facilities has been provided; but the demand for them must come from the innate love of knowledge or from the sense that it is part of the duty or self interest of the students to avail themselves of them.

I have probably said enough as to our Association, and may conclude this part of my address by stating that the policy of the Association in the future will be to maintain those facilities for pharmaceutical education which have successfully been created, and we confidently hope the demand for education will show that we have done wisely.

With your permission, I will now say a few words upon that well-worn theme of education. At first sight one would think that everything that the ingenuity of man could suggest had been said upon this subject, but in every age there seems to grow up along side the great truths of that age a number of fallacies which may to a large extent be traceable to the exaggerations of the truths.

I want you to think with me of education from two points of view, the first as a duty which we owe to ourselves and to the community in which we live, and the second as a source of happiness to ourselves and by reflex action also to the community.

With regard to education as a duty, I wish at once to specialize and to direct my remarks to the class I am addressing and to their particular occupation. When a man chooses a calling in life, from that moment it becomes a duty to himself for him to devote the best powers of his mind and body to learn that calling and to acquire all the knowledge he can about it. Before choosing his occupation in life a young man may take counsel with himself and weigh and consider all that can be said for and against any particular profession or occupation, either as a source of earning his daily living, or with regard to his own particular likes and dislikes, but when once the die is cast, and a youth has said; I will be a pharmacist, or I will be a soldier, from that moment he owes it to himself, whether he likes it or not, or whether he is disappointed or otherwise as to the remuneration he may get, to give the best powers of his mind and body and to give the chief place in the apportionment of his time to becoming a good pharmacist or a good soldier. In this he will derive a satisfaction in the exercise of his pursuit which he can get from no other source whatever. If he does not do this from the outset, and continuously throughout his career, he has no right in after life to grumble that the rewards and the prizes of his occupation have not fallen to his share. He has not worked honestly to deserve them.

It is also the young man's duty to the community in which he lives that he shall become educated in his calling, whatever that may be, or if he has not, he is to that extent dishonest and inflicts an injury upon Society. A grocer should know his business so well that he can vouch that the article which he sells to his customer is a genuine one. The ironmonger that the knife or the spade is an honest one, and so forth. If this is the case with all other trades, how much greater is the necessity which is laid upon pharmacists that they should know all that can be known about the articles in which they deal, because upon such knowledge may often rest the health and even the lives of those by whom they are surrounded. If chemists and those who are to become chemists would learn their business with their duty to themselves and to their neighbours constantly in mind, I feel certain their influence over those with whom they come into contact would be such that the result would be satisfactory from every point of view.

And now having tried to enforce upon you the duty of education, I must warn you against one of the exaggerations of the truth I have been considering. Education is not intended to make every man into an original investigator or a public instructor. We have recently had, as you know, the Pharmaceutical Conference in our midst, and you also know of the establishment of a Research Laboratory at Bloomsbury Square, and your imaginations have doubtless been fired with the glory and the halo which surrounds the individual who commits his discoveries to paper and reads them before some society or other. I do not wish to damp your enthusiasm, and if it is the result of a heaven-born spark of genius which is in you, I have no fear that I shall do so, but what I want to impress upon you is that for the ninety and nine out of every hundred the *primary* use of education is to enable them to perform their duty with greater satisfaction to themselves and greater benefit to their neighbours. There may be found a solid ground of satisfaction for those who have not been fortunate enough to be among the world's discoverers, and who have too

much self respect to present a repetition of what has been already done as original work of their own. In the past the great men whose thoughts and work revolutionized the world, were not often the products of the system of forcing, and societies, royal and otherwise, often enough gave such men and their discoveries the cold shoulder. It is as a reaction from this, and also to supply the needs of so many societies which must place themselves *en évidence*, and of the reams of paper which must receive their weekly or daily libations of ink, that we now rush into the opposite extreme; and the little thinkers and pseudo discoverers receive an amount of praise, which goes a long way to turn their heads from the true aim of life. I want you to fix it in your minds that the true, as distinguished from the false, purpose of education is the performance of our daily duties.

The second thought to be considered is of education as a source of happiness. Here it would be easy to dilate upon the pleasures of literature, of art, of music, and so on, which the blessing of a liberal education may bring into our lives: but again I am content to take pharmaceutical education, and consider a few of the ways in which directly and indirectly it may be made a source of happiness. Directly, of course, by the feeling that the pharmacist is oftentimes, in the exercise of his calling, the means of bringing joy and happiness into many families. There is no one, except the physician and surgeon, who can honestly indulge the feeling that he is a useful factor to the community in which he lives to so great an extent as the chemist, if he practises his vocation honestly. If he does not, but allows himself by modern competition to be driven to tamper with the quality of his drugs and thereby endangers the health of his customer, he should of all men be the most miserable.

Here I am tempted to digress and to speak of another duty which is incumbent on the man who has honestly qualified himself to conduct his business, and that is the duty which he owes to himself and his neighbour to see that he obtains from the public honest remuneration for his services. One writer upon this subject has said he knows of no principle which should guide us but the one consideration of how we may in the long run make the most money. This has never presented itself to me as a worthy object to set before ourselves, to make money as such. It is true we cannot do without it, but it is equally true that if we are honest and upright men we can do with very little of it rather than dishonour ourselves and debase our business by entering into several of the modern forms of competition. The question of fixing the actual amount of profit which may be demanded from the public in relation to particular trades is a complicated one, and it is more easy to follow in one's own life an unwritten code of honour and to aim at an ideal, than it is to put the same into words which may not be cavilled at, for the guidance of others.

It is, however, of the indirect sources of happiness which I wish to speak in connection with pharmacy. In no other trade are men by the necessities of their calling conducted to the very gates of so many sources of pure and unalloyed pleasure as in pharmacy. When the young pharmacist has so far completed his education that he may be said to be competent to exercise his profession, he must be intellectually dull indeed, if there has not been awakened in him a desire to proceed further along one of the many avenues of knowledge opened out to him. He knows something of physics and chemistry, and may easily learn to love one of the many branches into which these ramify; but as a source of the purest pleasure the introduction to natural history which he has received through botany and zoology should never fail him. I know the long hours and close attention which is required of the chemist, and that even when the outward and visible sign of attention to duty has been removed the chemist's apprentice and assistant is often confined to his post, but though his opportunities for contact with nature in the shape of walks into the country may be few and far between, as compared with his whilom schoolfellow, who has become a draper or a grocer—if he will use his opportunities and train his eyes and mind to see and think, a single walk will enable him to bring home a more ample contribution to solid pleasure than a dozen evenings spent in mere peripatetic exercise, whether it be along the pavements or around the billiard table. I would therefore urge upon every pharmacist to cultivate a love of nature, which will introduce him to whole realms of beauty and to sources of happiness of which the outer world has no conception, and when his daily task is done will lift his soul above the sordid cares and petty worries of his every day life. You may not all have read Mr. Alfred Russell Wallace's recent book on "Darwinism," and will, I am sure, not think it out of harmony with the advice I have been giving you, if I quote those beautiful lines from a poet-artist with which he concludes his tenth chapter on "Colour and Ornaments Characteristic of Sex."

"*On a Peacock's Feather.*

In Nature's workshop but a shaving,
Of her poem but a word,
But a tint brushed from her palette,
This feather of a bird!
Yet set it in the sun glance,
Display it in the shine,
Take graver's lens, explore it,
Note filament and line,
Mark amethyst to sapphire,
And sapphire to gold,
And gold to emerald changing
The archetype unfold!
Tone, tint, thread, tissue, texture,
Through every atom scan,
Conforming still, developing,
Obedient to plan.
This but to form a pattern
On the garment of a bird!
What then must be the poem,
This but its lightest word!
Sit before it; ponder o'er it,
'Twill thy mind advantage more,
Than a treatise, than a sermon,
Than a library of lore."

Mr. T. Rheeder proposed, Mr. A. Wright seconded, and Mr. T. M. Clague supported a hearty vote of thanks for the President's admirable address.

Mr. J. J. Dakers proposed the election of the following officers to form the Executive for the ensuing year, seconded by Mr. T. M. Clague:—

President, Mr. N. H. Martin; Vice-President, Mr. John Harrison; Secretary, Mr. Charles B. Ford; Treasurer, Mr. Thomas Rheeder; Council, Messrs. Bolam, Dunn, Stuart, Usher, Watson, Wright, Foggan Sarsfield, Noble and Brayshay.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The second meeting of the session was held on Thursday, October 31, in the Society's rooms, 6, Colquitt Street, when a paper was read by Mr. T. H. Wardleworth on "The Flora of the Wallasey Sand Hills."

In the course of an excellent paper Mr. Wardleworth described the peculiar formation of the sand dunes and the consequent variety of plant life to be found there. One section was formed of dry shifting sand, which necessitated long and deep roots to fix the plant and secure moisture. The other section con-

sisted of hollows corresponding to meadow land, where there was more soil formed by the drifting leaves and decaying vegetation. The latter were richer in flora than any other part of the sand hills, and the daisy, eyebright, yellow rattles, milkwort, British orchis, grass of Parnassus, star of Bethlehem, etc., were frequently to be found. Special attention was paid to the powers of adaptation displayed by many flowers, especially by the sand grass and sand sedge, which play such an important part in the maintenance of the hills in position.

The paper was illustrated by dried specimens, diagrams and the microscope.

Mr. Wardleworth, who was listened to with great attention, was accorded a hearty vote of thanks at the close.

The next meeting will be held on Thursday, November 14, when short papers will be read by Mr. H. Wyatt, Junr., on "Some Dry Reactions of Simple Salts," Mr. I. R. Johnson on "The Influence of Light on the Growth of Plants," Mr. G. E. Grattan will contribute some "Notes on Dispensing."

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The opening meeting of the twelfth session was held in the Pharmaceutical Society's House, 36, York Place, Edinburgh, on the evening of Wednesday, October 30, at 9.15. Mr. A. Russell Bennett, President, in the chair. There was a large attendance.

The minutes of the last meeting having been read and approved, Mr. McEwan, Vice-President, read the report of the Committee on the Association Prizes Competition. Four competitors had entered for examination. All of them had made a very creditable appearance and the prizes had been awarded as follows :—1st prize (value £2 2*s.*), to Mr. George Shaw, 17, North Bridge, with 89 per cent. of marks. The second and third prizes were equally divided between Mr. Reginald E. Macdonald, 41, Argyle Place, and Mr. William Smith, 119, George Street, who had each attained 77·5 per cent. of marks. A special prize, presented by Mr. John Findlay, was awarded to Mr. Alexander Cruikshank, 56, Newington Road, who obtained 73 per cent. of marks. The Committee expressed their gratification at the high average of marks attained by the candidates, but expressed a hope that a larger number of apprentice members would take advantage of the valuable opportunities offered by the prize scheme. The prizes were then presented by Mr. William Gilmour, Chairman of the Executive of the North British Branch.

Mr. A. Russell Bennet, President, then proceeded to deliver the following :—

Inaugural Address.

Gentlemen,—With this meeting we enter upon a new season, and it is with considerable misgiving that I address you this evening for the first time from this chair. Were it not that I feel confident in relying upon the cordial assistance of the office bearers and members of this Association, I should certainly have hesitated to occupy a position which has been previously held by men much better qualified to fill it with satisfaction to themselves and advantage to others. My position is rendered no more easy from the fact that I follow one who has risen to the very top of his profession, and whose high attainments are well known to you all.

I have had no small difficulty in choosing a subject on which to address you, as popular subjects have already been fully treated by previous presidents. After some consideration I came to the conclusion that some remarks on our Association and its work would prove interesting to most of you, and that for two reasons :

1st.—Very few of the present members know the whole history of the Association.

2nd.—We have little more than entered upon our second decade, and the opportunity seems a convenient one for reviving the past eleven years' work of the Association, and also for taking a brief glance at the advances made in chemistry, materia medica and pharmacy generally during its existence.

This Association, as some of you know, was the outcome of a suggestion made at a reunion of the chemists' assistants of this city in the spring of 1878. A good many years previous to this there was in existence an association known as the "Wilson Association," and so-called in honour of the late Dr. George Wilson, who was a warm friend of the pharmaceutical student. The proceedings of this association do not appear to have been published, and after an existence of about ten years it ultimately became defunct.

The present Association was formed in the year 1878 by a few of the assistants in town, and has therefore been in existence for eleven years. It commenced with a membership of forty-seven, and has gradually gone on increasing, and last session we had over ninety members on the roll. It is, I believe, the oldest of the kind in the country, with the exception of the London Association, which was started about the same time. At the time of its formation the members had to work under considerable disadvantages, but, thanks to the efforts of the original members, most of these disadvantages have to a large extent been overcome, and now the work of the Association, though still requiring zealous effort, goes on much more smoothly and satisfactorily than was possible in its earlier days. All along the Association has had the advantage of being granted the use of these rooms through the courtesy and kindness of the Pharmaceutical Society. Its success has also been due in a large measure to the active and lively interest taken in its proceedings by the local officials of the Society.

The papers read throughout the various sessions have all been of an interesting and useful character, many of them being printed *in extenso* in the Pharmaceutical and Trade Journals. With regard to these papers suffice it to say that after a careful study of all the records of the Association I have come to the conclusion that all of them have been highly practical and eminently instructive. Doubtless in the day when pharmacists will have a fuller say in the compilation of the national pharmacopœia, it will be found that many of the seeds sown here, though now apparently lying dormant, will spring up and bear fruit.

Any notice of the history of the Association would be incomplete without reference to the Prize Schemes which have formed so important and fruitful a part of its work. The working expenses of the Association being small, the surplus from annual subscriptions accumulated in the hands of the treasurer. In the year 1881 the Committee had seriously to consider how best to dispose of the money in hand, and it was ultimately agreed to institute a Prize Scheme for the benefit and encouragement of apprentice members. The course of study required for the competition was arranged on the lines of the requirements of our professional examinations, and the first prize takes the form of a free ticket, admitting to a course of lectures on chemistry in the Edinburgh School of Medicine. The other prizes have always taken the form of books suitable for pharmaceutical students.

The interest taken in the Association by the fathers of the craft was pleasantly shown when Mr. Ainslie, of Messrs. Gardner and Ainslie, stepped forward and offered an annual prize (value £1 1*s.*) to be competed for by apprentice members in the department of pharmacy. This offer was supplemented by a former President, Mr. Wm. Aitken, and several extra prizes

have been given by friends of the Association. I would take this opportunity of urging upon every apprentice member the desirability of coming forward to the Ainslie Pharmacy Prize Competition in March.

Another interesting feature of the Association's work is the botanical excursions. These were instituted three years ago, and have proved of great interest and practical value to those studying for examination, as well as to those studying for pleasure. As a result of these excursions a herbarium has been formed for the use of the Association, and is making satisfactory progress. As you will observe from the syllabus, the more recent additions will form the subject of a paper during the present session.

Leaving our Association and its work, let me glance for a moment at the advances that have been made in the various branches of our calling during the period of our Association's existence. Without doubt the greatest interest centres around the coal-tar derivatives. The high cost of natural quinine in the early days of our Association gave a fresh impetus to the search for some mode of forming it synthetically. This, though unsuccessful, has led to the introduction of many new remedies, some of which have had only an ephemeral existence, while others are now well established. Of the former I may mention *kairin*. Introduced in 1881, there was for a short time a demand for it, but it seems to have dropped out of use. Its place has been well filled by *antipyrin*, as to which it is rather to be regretted that its praises have been too freely sung, the result being its indiscriminate use by all and sundry. Among others that might be mentioned are *phenacetin*, for which there is a steady demand; acetanilid, which has the merit of being the cheapest; salol, naphthol, hydronaphthol, urethane, amylene hydrate, hypnone, paraldehyde, sulphonal and saccharin.

In the department of materia medica very important work has been done. The alkaloids of cinchona and cuprea, aconite, belladonna, nux vomica and opium have been very thoroughly studied. Coca and its alkaloid, cocaine, though discovered so early as 1860, have been brought into extensive use during the lifetime of our Association. The great success of cocaine has led to the introduction of one or two more or less suspicious substances. Hopeine, said to be obtained from American wild hops, attracted a good deal of attention, but Dr. Paul has shown it to be a mere mixture, and the scarcity of wild hops in America confirms the doubts as to its origin. Drumine, a similar body said to be got from *Euphorbia Drummondii*, was reported from Australia, but chemical examination proved it to be merely calcium oxalate. Whether its introduction was due to fraud or gross ignorance I have never been able to discover.

In the science of botany great advances have been made during recent years, and the methods of teaching it have undergone a very marked change. Now-a-days the system adopted is to group all the facts and laws of the science round the life history of certain plants selected as types. Botanical classification has also been carefully correlated and consolidated in that great work, the 'Genera Plantarum' of Bentham and Hooker. In it the best points of all previous systems have been preserved and blended into one, and the study of systematic botany has been much simplified through the various names given by different observers having been reduced to something like order. The influence of this work is very perceptible in the new edition of the Pharmacopœia. The study of the microscopic forms of plant life has received a great impetus, and under the name of bacteriology is now pursued as if it were a science by itself.

One of the most important events to us as pharmacists, during recent years, is doubtless the appearance of the British Pharmacopœia of 1885, but it has already been so frequently noticed here that I need not further refer to it now.

Another important event is the appearance of the B. P. C. Formulary. I will only say of it, that in reducing to order the ever increasing army of non-official remedies it is doing good work, and I trust it will go on and prosper.

Before closing, allow me to say a word about the advantages to be derived from membership of such an Association as ours. Edinburgh is a centre for education and examination. Many young men come here from all parts of the country. Very often they are without friends, and do not know where to find them. Here we make all welcome, and many valuable and lasting friendships are the result of our meetings. Intercourse with fellow craftsmen here tends to round off the angularities which are apt to adhere to all of us. At our meetings all new remedies are discussed as soon as they appear, and those who may not otherwise have the opportunity can see and handle them for themselves. New theories in connection with various sciences are also discussed, and thus we are able to keep ourselves abreast of the times.

It has often been said that imitation is the sincerest form of flattery, and in this respect our Association has been flattered. Members leaving us have been instrumental in starting similar associations elsewhere, and we heartily wish them every success in following our footsteps.

And now, in conclusion, we have seen that others have laboured, and we have entered into their labours. Let us faithfully carry them on, labouring for that ultimate end of knowledge which Bacon described as employing the gift of reason to the benefit and use of mankind, and always remembering that—

"Labour with what zeal we may
Something yet remains undone;
Something uncompleted still
Waits the rising of each sun."

In moving a vote of thanks, which was cordially awarded, Mr. Donald McEwan, Vice-President, said he thought it was a great advantage to have such a history to look back to as that referred to in the address. The Association also offered great advantages for enlarging their experience of the practice of pharmacy, and its social advantages, of which their annual conversazione was the most conspicuous feature, were also of the highest value.

Mr. Gilmour, in seconding the motion, said he had listened with much pleasure to the President's interesting review of the Association's work. There was one point which he would like to emphasize, and that was the great value of the prize scheme. He would most strongly advise the apprentices to enter these competitions, for they would thereby gain that confidence which was so desirable under examination. It mattered little though they failed, for after all the prize was not the best thing to be gained. The knowledge acquired had a permanent value. Another feature of their work was the morning botanical excursions. He thought that was a grand idea and of great value to those who had very little opportunity for outdoor recreations. At Dundee the other day he had ventured to speak in high terms of the mental, moral, and physical qualities of the present generation of chemists' assistants in Edinburgh, and he believed all these good qualities would be materially benefited by these early excursions. He thought the address would keep up the prestige of their Association, and he had great pleasure in seconding the vote of thanks.

Mr. D. B. Dott said he had much pleasure in hearing of the flourishing condition of the Association. It was often said that there was more enthusiasm in the junior Association than in the older one, and that was

very natural, for young men were always more enthusiastic. The reference to *drumine* reminded him of an incident in his own experience. He had sent to him a substance said to be a new opium alkaloid. On igniting a little on platinum foil he found that it nearly all remained, and on testing it turned out to be simply calcium sulphate with a little adherent *papaverine*. Doubtless the discoverer had got a slight colour reaction with sulphuric acid, and jumped to the conclusion that he had found something new.

Mr. Thomas Thompson said he could cordially endorse what previous speakers had said. He was much grati fied to see so large a turn out, and could congratulate those at the head of the Association on the scientific and interesting syllabus they had prepared for the session. He thought this Association offered a splendid opportunity of investigating and discussing things that occurred in their ordinary experience in such a way as to benefit themselves and others. The discussion was continued by Messrs. Coull, Duncan, Henry, Hill and Lunan.

Mr. W. B. Dougall was elected Secretary, Mr. J. Findlay, Assistant Secretary, and Mr. A. J. Clark member of Committee. The Chairman having intimated that the next meeting, on November 13, would be an open one under the charge of Mr. George Coull, B.Sc., Ex-President, the meeting was closed.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fifth meeting of the session was held in the Association's rooms, 74, Commercial Street, on Thursday evening, October 31. Mr. John Forsyth in the chair. There was a very large attendance, doubtless due to the fact that it was the first of the series of "Musical and Social evenings" which are to be held in connection with the Association during the winter.

The arrangements for the evening were in the hands of Messrs. Alexander Adam and D. Johnstone, and these gentlemen provided an excellent programme.

The committee which was appointed to make arrangements about the conversazione then met. Mr. Isaac Hyslop was appointed secretary of this movement. After discussion it was decided to hold the First Annual Conversazione and Ball on Wednesday evening, December 18, 1889, in Speed's Hall. It is to be hoped that not only the members of the Association but a number of the local chemists will turn out to this Ball and make it a complete success.

The next meeting of the Association will be held on Thursday evening, November 14, when a paper on "Putrefaction and Fermentation" will be read by Mr. Frank W. Young, F.R.S.E.

British Pharmaceutical Conference.

MEETING AT NEWCASTLE-UPON-TYNE.

Wednesday, September 11.

(*Concluded from page* 359.)

As a sequence to the foregoing paper the following was read—

Liquor Morphinæ Meconatis.

BY C. A. MACPHERSON.

The pharmacopœial solution of morphine bimeconate is a preparation which is nearly allied to the official 1 per cent. solutions, and like them has an indefiniteness about it which is not desirable. On comparing its formula with that given for the morphine hydrochlorate solution, it seems as if it were intended to have both solutions of the same alkaloidal strength, the same quantity of morphine hydrochlorate being ordered for what presumably is intended to be in each instance 2 fluid ounces of solution. Such a result cannot be obtained in practice, since in following the official process a loss of alkaloid is sustained, which will be greater or less according to the care and skill exercised by the operator; and the finished product, instead of containing $5\frac{4}{5}$ grains of 'bimeconate' in each ounce, as it would if there were no loss, is more likely to approximate to the strength stated in the Pharmacopœia—about $5\frac{1}{2}$ grains in 1 fluid ounce.* Strangely enough, while an attempt has been made to have both solutions of the same alkaloidal strength, the official dose of each has been based not on the proportion of alkaloid contained in it, but upon that of its particular salt.

In the Pharmacopœia it is stated that the bimeconate solution is about the same strength as tincture of opium, as regards meconate of morphine, but the only reason for adhering to this somewhat indefinite standard seems to be that it was the one adopted for the unofficial preparation of which it is an imitation. It thus becomes a question whether it would not be advisable to include this preparation in the 1 per cent. solutions, and supersede the present tedious and inexact process by one which will yield a definite product. This could be accomplished by adopting either of the following formulæ:—

(1) *Liquor Morphinæ Meconatis.*

Take of—	
Morphine meconate†. .	35 grains or 3·5 parts.
Meconic acid	10 grains or 1· part.
Rectified spirit	2 fluid ounces or 87·5 fluid parts.
Distilled water a sufficiency to make . . .	8 fluid ounces or 350· fluid parts.

Mix the morphine meconate, meconic acid and rectified spirit, and add as much distilled water as will make the solution measure 8 fluid ounces or 350 fluid parts at 60° F. (15·5° C.)

(2) *Liquor Morphinæ Meconatis.*

Take of—	
Morphine hydrate‡ .	25 grains or 1·25 parts.
Meconic acid . . .	20 ,, ,, 1 part.
Rectified spirit . . .	2 fluid ounces or 43·75 fluid parts.
Distilled water, a sufficiency to make	8 fluid ounces or 175 fluid parts.

Mix the morphine hydrate, meconic acid and rectified spirit, and add as much distilled water as will make the solution measure 8 fluid ounces or 175 fluid parts at 60° F. (15·5° C.).

The first formula yields a solution containing $4\frac{3}{8}$ grains of morphine meconate in each fluid ounce, or 1 part by weight in 100 similar parts by measure. The second one differs slightly, the proportion of meconate in this case being 1·006 per cent.

It may be objected that by adopting the proposed formula a weaker preparation would be substituted for the one previously in use. Such certainly would be the case, but the difference is not so very great and the objection is not insurmountable. By calculation it is found that a tincture made from opium yielding 10 per cent. of morphine should contain the equivalent of 5·58 grains of "bimeconate" in each ounce or 1·27 per cent.; this is equal to 4·95 grains or 1·13 per cent. of meconate. The proposed solution contains 1 per cent. of meconate, which is equal to 1·127 per cent. of "bimeconate." The decrease in strength could easily be compensated for by increasing the dose, and by

* The statement in the 'Extra Pharmacopœia' that it contains about $6\frac{1}{2}$ grains in the ounce is incorrect.

† $(C_{17}H_{19}NO_3)_2C_7H_4O_7,5H_2O$. Dott: *Pharm. Journ.*, [3], ix., 883.

‡ $8\,C_{17}H_{19}NO_3,9\,H_2O$. Dott, *Pharm. Journ.*, [3], xviii., 702.

making this the same as for the other morphine solutions it would be more in unison with the actual potency of the preparation than the official dose is with that of the present one. By changing the name to that indicated, which is the more correct one, there could be no misunderstanding as to what was meant, while there would be the advantage that a standard solution of a well-defined salt would be employed in place of an indefinite one of a hypothetical compound.

The following three papers were then read—

The Strength of Commercial Samples of Scheele's Prussic Acid.

BY R. WRIGHT,

Pharmaceutical Chemist.

It is a well-known fact that the above acid as found in retail pharmacies varies greatly in strength, and it was deemed desirable to ascertain whether a similar variation occurs in the strength of samples sent out by wholesale houses.

With this object in view a small supply was procured from several of the principal drug houses. In all, twelve samples were obtained. Of these, one was said to contain 4 per cent. hydrocyanic acid; three were said to contain 5 per cent., three were described as being rather more than twice as powerful as the acid prepared by Vauquelin's process; one was stated to be nearly three times the strength of the pharmacopœial article, while the labels on the remainder afforded no clue whatever to the strength of the contained solution. The process employed for estimating the strength of the various samples was as follows:—About 2 grams of the acid to be estimated was weighed into a flask, into which 15 or 20 c.c.'s solution of potash (B.P.) had been introduced, the mixture diluted with distilled water, and titrated with decinormal solution of silver nitrate, the production of a permanent turbidity indicating the end of the reaction.

Litmus was used as an indicator, and the percentages given represent the mean of two estimations.

No. of sample.	Percentage amount of HCy.
1.	3·6
2.	3·7
3.	4·0
4.	4·2
5.	4·4
6.	4·8
7.	4·9
8.	5·0
9.	5·0
10.	5·1
11.	5·1
12.	5·7

From the above table it will be seen that the strength of the specimens examined varies between the limits of 3·6 and 5·7 per cent. HCy, a difference of 2·1 per cent.

In view of the variation in the strength of this acid, and the consequent danger attending its administration in large doses, it is very desirable that a definite standard of strength should be fixed.

The Unofficial Formulary Committee might usefully take the matter in hand with a view to securing uniformity in the strength of so potent a medicinal agent.

The Relative Value of Chloroform and Alcohol, and Mixtures of the Two, for the Extraction of Aconite and Belladonna Roots.

BY R. WRIGHT,

Pharmaceutical Chemist.

In Squire's 'Companion to the British Pharmacopœia,' directions are given for making two preparations termed chloroformum aconiti and chloroformum belladonnæ.

The process consists in percolating the powdered root with chloroform, and the finished product is of such strength that a fluid ounce is equivalent to 1 ounce of the root.

The preparations named are used to some extent in pharmacy, and are to be found quoted in most of the wholesale drug lists.

With a view of ascertaining whether chloroform had any advantage over alcohol for the extraction of aconite and belladonna roots, and also what was the specific action of mixtures of the two in definite proportions upon these roots, two series of experiments were instituted.

In the first series, 10 grams of the root in No. 40 powder was macerated with 200 c.c. menstruum for fourteen days, the mixture being shaken daily. It was afterwards filtered. In the second series 50 grams of the powdered root was moistened with menstruum, and the mixture packed in a percolator. A further supply of menstruum was added, and when the liquid commenced to drop the lower orifice of the percolator was closed, and the whole allowed to macerate for three days. Percolation was then commenced, and allowed to continue until 100 c.c. of percolate had been obtained.

The following processes were employed for estimating the alkaloidal strength of the tinctures:—

Belladonna.—The simplest and most reliable process for the estimation of the belladonna alkaloids was found to be that proposed by Dunstan and Short, *Pharm. Journ.*, vol. xiv., p. 625. Twenty c.c. of the tincture to be estimated was shaken up with two successive 10 c.c. distilled water, by which means the alkaloids are withdrawn from solution in the chloroform-alcohol mixture with the alcohol, the chloroform retaining the colouring matter. The latter is drawn off, the alkaloidal solution rendered alkaline with ammonia, and the alkaloids removed by agitation with two successive 10 c.c. chloroform. The mixed chloroformic solutions are afterwards evaporated in a clean tared platinum dish over a water-bath, until the weight is constant.

In experiment 1 in each series the colouring matter was removed by shaking with chloroform, and in No. 6 the alkaloids were removed by agitation with dilute alcohol.

Aconite.—It was first attempted to apply the process employed for the belladonna tinctures to the estimation of those of aconite. It was found, however, that the chloroform not only retained the colouring matter, but also some of the alkaloid, and therefore the following process was adopted:—

Twenty c.c. of the tincture was introduced into a porcelain dish, with 1 c.c. dilute sulphuric acid (B.P. strength) and 9 c.c. distilled water, and the mixture evaporated over a water-bath until the chloroform and alcohol had been driven off. The residual solution was filtered when cold, the filter being washed with another 10 c.c. distilled water. The mixed filtrates were rendered alkaline with ammonia, and the alkaloids extracted by agitation with two successive 10 c.c. chloroform. The mixed chloroformic solutions were then evaporated over a water-bath in a tared platinum dish until the weight of the residue was constant.

The following tables represent the results obtained. In each case two estimations were made, the mean of the two being taken as correct.

The important conclusions to be drawn from the results recorded in the tables are—

(1) That chloroform, *per se*, does not nearly exhaust aconite and belladonna roots of their alkaloids.

(2) That a mixture of chloroform and alcohol is superior to alcohol alone as a menstruum for their extraction.

Table I.—Representing Alkaloids obtained from the Belladonna Tinctures.

Menstruum employed.	Quantity taken.	Alkaloidal residue in grams. Series I.	Series II.
Alcohol 84 p.c. . .	20 c.c.	·006	·030
Alcohol 4 vols. Chloroform 1 vol. .	20 c.c.	·008	·040
Alcohol 3 vols. Chloroform 1 vol. .	20 c.c.	·006	·035
Alcohol equal Chloroform vols.	20 c.c.	·007	·035
Alcohol 1 vol. Chloroform 3 vols.	20 c.c.	·007	·033
Chloroform	20 c.c.	·006	·011

Table II.—Showing Alkaloidal Residues yielded by Aconite Tinctures.

Menstruum employed.	Quantity taken.	Alkaloidal residue in grams. Series I.	Series II.
Alcohol 84 p.c. . .	20 c.c.	·009	·066
Alcohol 4 vols. Chloroform 1 vol. .	20 c.c.	·009	·074
Alcohol 3 vols. Chloroform 1 vol. .	20 c.c.	·009	·076
Alcohol equal Chloroform vols.	20 c.c.	·009	·068
Alcohol 1 vol. Chloroform 3 vols.	20 c.c.	·009	·056
Chloroform	20 c.c.	·006	·034

Note on an Impurity in a Commercial Sample of Sodium Salicylate.

BY R. WRIGHT,

Pharmaceutical Chemist.

In dispensing a mixture with a fresh supply of sodium salicylate received from one of the leading drug houses a few days ago, it was remarked that the salicylate was not easily and completely soluble in cold water.

As sodium salicylate is a very soluble salt it was judged that some foreign substance must be present in it.

In order to ascertain the nature of the impurity, 500 grains of the salicylate was shaken up with 2 ounces of distilled water to dissolve out the soluble salt. On standing, a white, granular precipitate subsided. The mixture was thrown upon a filter, the precipitate well washed with distilled water, and dried in a water-oven.

In this way 8 grains of the substance was obtained. It possessed the following characters and properties :— In minute white crystals, destitute of odour, with a sweetish, rather acrid taste. Heated in a narrow tube, it fused and sublimed without decomposition. Heated on platinum foil it was entirely volatilized. Slightly soluble in cold water ; more soluble in hot water. It was soluble to some extent in chloroform, more so in alcohol, and freely soluble in ether.

The aqueous solution was acid to test-papers, and effervesced on the addition of sodium carbonate.

From alcohol it separated in long needles ; from a concentrated aqueous solution in stellate groups of short prismatic crystals ; from a weaker solution in long needles.

The aqueous solution gave a violet coloration with ferric chloride ; and a white crystalline precipitate with mercuric chloride, soluble in acids.

Heated in a sealed tube with concentrated HCl it yielded CO_2 and phenol.

The above tests indicate free salicylic acid as the impurity present in the salicylate.

Mr. Plowman said it was very important to know what were the best solvents, and he noticed in one case there were four volumes of alcohol to one of chloroform, and in the other three to one. Was there any special reason for altering the volumes in the two menstrua?

Mr. Naylor said he had had an opportunity of testing the impurity in the sample of salicylate of soda referred to by Mr. Wright, and he found the melting point corresponded precisely with the melting point of commercial salicylic acid.

Mr. Groves said he should like to remark on the weakness of chloroform for extracting aconite and belladonna roots. On one occasion he found a chloroform belladonna liniment contained but a very small portion of the alkaloid, practically none, and in considering the matter he thought possibly it might be due to the fact that the alkaloids existing in the roots were in a saline condition. They were not alkaloids, but salts of alkaloids. They knew very well that when an alkaloid was dissolved in either chloroform or ether it was easily shaken out by acids, even acetic acid would remove the whole of it. He made some experiments by moistening aconite and belladonna roots with ammonia, allowing it to remain about two hours, then drying carefully, and then percolating with chloroform ; he found they yielded much more alkaloid. But there was some difficulty in percolating with chloroform a body so mobile and so heavy that it ran through the marc too quickly, so that it had to be restrained by a tap. It was also desirable that spirit should not be mixed with the chloroform. Belladonna and aconite were often mixed with oil, and if spirit were used together with chloroform the miscibility would be destroyed to a great extent.

The President said these matters were very interesting. He himself for years had made chloroform belladonna liniment and aconite liniment also freely by percolation of the roots by chloroform, and therefore he was rather surprised to see what little solvent power the chloroform had on the roots. He was glad to hear the remarks of Mr. Groves, for they had all been making this liniment, which was proposed by the late Mr. Peter Squire, who recommended that it should be made from belladonna root by percolating with chloroform. It showed the advantage of coming together and discussing these points. With regard to hydrocyanic acid, it was very much to be regretted that notwithstanding the attention which had been called to this matter these varying strengths should still be found. Scheele's acid was little used in dispensing compared with the official acid, but there was no reason why it should not be somewhere near 4½ per cent. when met with in the trade.

Dr. Thresh said, in answer to Mr. Plowman, that Mr. Wright in the table gave the amount of alkaloid obtained by using various proportions of alcohol and chloroform. He (Dr. Thresh) had simply selected from the table the figures showing the results with pure alcohol and chloroform and the mixtures that gave the greatest yield. In the one case, that of aconite, 3 to 1 of chloroform gave the largest percentage, whilst in the case of belladonna it was in the proportion of 4 to 1.

The last paper read was on—

Casearia Esculenta.

BY DR. P. S. MOOTOOSWAMY, F.L.S., TANJORE.

Nine species of casearia are described by Roxburgh, of which five are indigenous to Southern India. *C. esculenta* is a large shrub or small tree with leaves alternate oblong, entire and smooth ; flowers axillary and greenish-yellow ; stamens and nectaries united at the base. The tree is found in the Circar mountains, the Travancore ghauts, and Varoosa-puthee, and other parts of the Tanjore district. It belongs to the natural order Samydaceæ.

The root is the part employed in Hindu medicine and sold in medical bazaars. The Tamil names are

Kadalashingi and *Kadaloorangi*, and its Telugu name is *Gundu gungura*. The tree takes its name, it is said, from the root having the supposed property of drying up the sea.

The root is of various sizes, usually about an inch in diameter, sometimes more, sometimes less. The surface is bright yellow, and scales off in very thin layers like tissue paper. The bark is reddish-brown. The wood of the root is light brown and made up of one or more concentric layers according to the age of the tree. When the drug is powdered in a mortar the broken pieces of bark adhere together on account of the fine, long, silky liber cells. The cobweb-like appearance of the partially powdered drug, and the bright yellow coating of the bark are two characters, I think, which distinguish it from all other articles of Indian materia medica. Sometimes another bark is called *Kadaloorangi*, which is in long fibrous pieces, and has a bitter and astringent taste. This other bark I have found to be from *Kydia calycina*, belonging to the Malvaceæ, and containing, like most plants of that order, very gummy properties.

Casearia root is now coming into use as a valuable medicine for chronic enlargement of the liver, for hepatic obstructions and for piles. It is a gentle aperient, notwithstanding the tannin present, and the dose should be equal to 2 to 3 drachms of the root. I have long known it to act as a specific in diabetes when administered in powder or decoction. One part of powder with one-fourth its weight of sugar is given twice a day. The formula for decoction is

Root bark of casearia	ʒij.
Cinnamon bark	ʒij.
Aniseed	ʒij.
Water	ʒx.

To be boiled down to three ounces. Dose, one ounce and a half twice a day. It is considered to be an alterative in skin diseases by some Vythians, especially in that disease called *Padurthamaray* in Tamil, where a spreading hepatic complaint affects the lower part of the abdomen and extends around the back. The fresh bark is ground with water and applied to the parts affected. The extract and syrup of casearia are the preparations now consumed in Bombay to a great extent. The extract is made by exhausting the powdered root with water, and evaporating to the consistence of a soft extract; the dose of this is 20 grains. The syrup is a solution of the extract in sugar and water, and contains 20 grains in two teaspoonfuls.

Mr. D. Hooper has analysed the roots of *Casearia esculenta*, and furnishes me with the results of his investigation as now communicated. The drug contains 3 per cent. of neutral yellowish resins soluble in ether and partly soluble in spirit of wine. About 10 per cent of tannin, giving a greenish colour with ferric chloride, was contained in the alcoholic extract. This tannin, from the composition of its lead-salt and the formation of a soluble crystalline product when boiled with diluted acid, resembled rhatania-tannic acid of Wittstein. Water dissolved out an organic acid having the peculiar characters of cathartic acid, both in its chemical tests and physiological action. The root also had a small quantity of starch, and left 4·8 per cent. of mineral matter when burnt.

The PRESIDENT said the Conference was very glad to find a gentleman in India, a native doctor, had sent this communication, which had been received through one who had always been deeply interested in pharmacy, Mr. David Hooper.

THE BELL AND HILLS FUND.

Mr. NAYLOR said the books were on the table, which consisted of nine volumes provided by the Bell and Hills Fund, through the generosity of Mr. Hills in memory of Jacob Bell, and two volumes given by Mr. Thomas Hanbury in memory of his brother Daniel, being that gentleman's 'Science Papers,' and 'Pharmacographia.' Such a gift was made to every town having a local association which the Conference visited. The books were the selection of the North of England Pharmaceutical Association, which, as Mr. Martin would tell them, had had some difficulty in making a choice, having already such an excellent library. He had much pleasure in making the presentation.

Mr. N. H. MARTIN said as President of the Local Association it devolved upon him to accept this munificent gift on its behalf. It was not at all necessary that the visit of the Conference should be commemorated in this tangible manner to prevent it being forgotten, but he need not say that the pleasure would be enhanced by the fact that day by day and year by year they would have before them in the library these volumes to remind them of the visit. Mr. Naylor had referred to the existing library, which was founded some three years ago, in which they were fortunate enough to possess a number of books from the collection of Henry Deane, the first President of the Conference, and also some which had belonged to Henry Brady, but they would all be delighted to have in addition to those two honoured names those of Bell, Hills and Hanbury associated with the library. A portrait of Jacob Bell, an original proof signed by Landseer, hung on the library walls, and as the students contemplated it, he hoped it might prove a stimulus to them to imitate his example and work for pharmacy. He regretted very much to say that up to the present their library and museum had proved to be in excess of the local requirements, as shown by the demand for books and specimens, but it was to be hoped that the masters, assistants and apprentices would be so stimulated by the visit of the Conference and the excellent papers which had been read to become more enthusiastic for education and original research, that in another year's time such a complaint would not have to be made. These volumes were so magnificently bound that it almost seemed a pity to use them, but he took it the highest compliment they could pay to the donors would be to use them so continually that when the Conference came again to Newcastle in twenty-five years' time the binding would be well worn and the pages well thumbed, whilst the contents had been absorbed by the students, who would show by the papers then read that valuable use had been made of the gift.

THE FORMULARY COMMITTEE.

The PRESIDENT moved the re-appointment of the Formulary Committee, which had a considerable deal of work in hand, though not quite ready for publication.

Mr. SIDNEY PLOWMAN seconded the motion, which he suggested would sound better if it took the form of requesting the members of the Committee to continue their labours for another year. He had had occasion before to refer to the great services which this Committee had rendered, and he was quite sure the motion would be carried.

The motion was carried unanimously.

THE PLACE OF MEETING IN 1890.

Mr. R. REYNOLDS said he was requested by his colleagues on the deputation from the chemists of Leeds which attended the Conference to lay before it an invitation, requesting that Leeds might be honoured by being chosen as the next place of meeting. It might seem strange that a town of such magnitude had not yet had the privilege of entertaining the Conference, but the last meeting of the British Association in Leeds was in 1858, and that Conference was born five years later. The British Association had visited the county of York three times since then, at York, Sheffield and Bradford, and, of course, those

circumstances had not been favourable to the early selection of Leeds. It was probably felt that there might be too much even of Yorkshire, and although an invitation had been sent in the meantime, it was only accepted last year, when Leeds was fixed upon for next year's meeting and all arrangements were in train. It was therefore hoped that as usual the Pharmaceutical Conference would accompany or precede the British Association in its visit. He would not use any exaggerated language in order to attract members, and would admit Leeds was a town in which the work exceeded the play, but that would be no novelty to pharmacists. There were many matters of interest to be seen; they had in connection with the modern university system one of the three colleges constituting the Victoria University, having a building corresponding in scope and object to that in which they were assembled. Their industries were of a varied character, in fact they rather claimed to have a greater variety of manufactures than almost any other town. He could not boast, as the gentlemen in Newcastle who were putting off their armour might, but he could modestly promise that they in Leeds would do their best to make the meeting a success. He had been very much pleased with the admirable reports of that meeting given in the local press; he knew the difficulties of reporting such meetings, and remembered some years ago when Mr. Groves read a paper entitled "The Rancidity of Fats in connection with Ointments," it was reported as being "The Rancidity of Facts," but he could cap that example by what appeared in a Leeds paper that morning, which in referring to the President's address said "he expressed the hope that the Conference in conjunction with the Medical Council would succeed in getting the British Pharmacopœia declared obsolete and illegal." If, however, through this report, the Conference had at all lost public confidence in Leeds, which was a very law abiding town, he trusted matters would be put right next year if the invitation were favourably received.

Mr. G. WARD desired to add a word in support of the invitation. He was quite sure that the magnitude and importance of Leeds were such that it was quite time it received a visit from the Conference.

Dr. THRESH moved that the invitation so cordially given to the Conference by Mr. Reynolds and Mr. Ward on behalf of the Leeds chemists be cordially accepted. He was himself a Yorkshireman, who came from near Leeds, and was proud of it; he could assure the members they would meet with a hearty reception if they went there.

Mr. CONROY seconded the motion, which was at once agreed to.

VOTES OF THANKS.

Mr. SCHACHT moved—

"That the cordial thanks of the non-resident members of the British Pharmaceutical Conference be given to the Local Committee, and especially to Messrs. Martin, Clague, Proctor and Harrison for the very successful manner in which all the arrangements connected with their visit to Newcastle had been carried out."

He was very glad the word *all* had been introduced into the resolution, as it recalled to their minds the very varied duties which the gentlemen referred to had undertaken and carried out. It was not the first time he had had the pleasure of proposing such a resolution, for the members of the Conference were generally extremely well received by their brother pharmacists, who always appeared anxious to do the best they could, but it was not always that the locality was so fortunately placed as Newcastle happened to be, and the gentlemen or ladies concerned had thrown a spark of originality into the proceedings, which was unique, having very kindly made special arrangements by which the ladies whom some members were fortunate enough to bring with them, had occupation and amusement provided for them while their companions were otherwise engaged. It was only right to say that this part of the Committee's work had been very highly appreciated.

Mr. BENGER had the greatest pleasure in seconding the motion. There was nothing but congratulation to be given to the Local Committee for the very successful efforts which had been made to provide for the comfort, convenience and recreation of the members and the lady visitors.

The motion having been carried unanimously,

Mr. MARTIN said it was a very great gratification to him, and must be so to his colleagues, who had so ably and energetically assisted him, to hear gentlemen of so much experience say that all the arrangements had been carried out to their satisfaction, and such testimony was an ample reward for any little trouble they had taken. If there had been any little hitch or shortcoming he hoped it would be considered their misfortune rather than their fault. There still remained the excursion, as to which he might say that every effort had been made to secure fine weather for the trip.

Mr. T. MALTBY CLAGUE said it would be absurd for him to say that there was no work for a local secretary; there were too many present who had already filled the office, and he should not like either to deceive any of the embryo local secretaries who were listening to him. There was a great deal of work, but there were many redeeming features about it. It brought one in contact with one's neighbours, and showed that some of the most genial good fellows in the world were to be found in the ranks of pharmacy. Such labour, like virtue, was its own reward, and he should be quite ready to undertake the post then, if they were back again in the same position as in the previous year, knowing what he then did of the duties.

Mr. PROCTOR said he thought members had had enough of him during the last two days, but he would not detain them long. They had arranged the matter very nicely beforehand, it being agreed that Mr. Clague was to have all the work, Mr. Martin all the glory, and himself all the cash, in consideration of which he was to fill up a gap in the list of names and make the thing look respectable.

Mr. WOOLLEY moved—

"That the best thanks of the meeting be given to President, Principal and Council of the College of Science for having placed the College at the disposal of the Conference for its meeting at Newcastle."

The proposition would commend itself to everyone present, who would all feel how fortunate they had been in being privileged to use that beautiful building. It was very pleasing indeed to find that wherever they went they had such privileges afforded them, such buildings having grown up all over the country and the process still continuing. This was some recognition of the power and usefulness of the Pharmaceutical Conference. Newcastle had every reason to be proud of that beautiful building, which, however, was only a portion of what it was destined one day to be. He had been much interested in inspecting the chemical laboratories, and could not but think that the young men of the neighbourhood were very fortunate in having such an institution in their midst.

Mr. MABEN seconded the motion, which was carried unanimously.

Mr. MARTIN said the staff of the College were too busily engaged in connection with the arrangements for the British Association to be present, but as a humble member connected with the College he would accept the vote which had been passed, and which he was sure would be a gratification to the Principal.

Election of Officers.

The following gentlemen were elected as the officers of the Conference for the ensuing year :—

President.—C. Umney, F.I.C., F.C.S.

Vice-Presidents.—M. Carteighe, F.I.C., F.C.S., S. Plowman, F.R.C.S., A. Kinninmont, W. Smeeton.

Treasurer.—W. Martindale, F.C.S.

Hon. General Secretaries.—J. C. Thresh, D.Sc., M.B., and W. A. H. Naylor, F.I.C., F.C.S.

Local Secretary.—F. W. Branson.

Other Members of the Executive Committee.—J. E. Brunker, M.A., M. Conroy, F.C.S., R. H. Davies, F.I.C., D. B. Dott, F.R.S.E., A. W. Gerrard, F.C.S., T. Maben, F.C.S., B. S. Proctor, F.I.C., F. Ransom, F.C.S., J. Harrison.

Auditors.—T. Rheeder and G. Ward.

Mr. GROVES moved—

"That the hearty thanks of the Conference be accorded to the President for the very able and courteous manner in which he has conducted the business of the meeting."

He said all present were as well able as he was to judge of the ability displayed by Mr. Umney, and must have noticed how thoroughly he had brought out the points arising on the various papers. The Conference was much indebted to him, not only for his address, but for much of the success of the meeting.

Mr. PROCTOR seconded the motion. It had occurred to him over and over again during the discussions how much the President had added to the value of the discussions by his opening and concluding remarks.

The motion was carried by acclamation.

The PRESIDENT said he had said so much during the last forty-eight hours, that he hesitated almost to say anything more, but he could not help thanking the members for the very great kindness he had received from them and for the renewal of their confidence as shown in again placing him in the post of President. It had been a great pleasure to him to come there and see some of his old friends who were almost grey-headed when he began his career twenty-five years ago. He had always looked forward to getting to the front, and if all young men would strive to do their best, they might be sure their chances of success would become better as their calling advanced. He had only to allude to the training and the help he had received from the Pharmaceutical Society and the Conference as an incentive to young men to do all they possibly could to make themselves perfect in the art and practice of pharmacy.

Parliamentary and Law Proceedings.

THE PHARMACEUTICAL SOCIETY OF GREAT BRITAIN *v.* CHARLES TYRELL.

Before his Honour Judge Leonard at the County Court, Southampton, on the 22nd ulto., The Council of the Pharmaceutical Society of Great Britain sued Charles Tyrell, of the St. Luke's Drug Stores, Bevois Valley, Southampton, for five penalties of £5 each for selling or keeping open shop for the retailing, dispensing or compounding of poison upon various dates.

Mr. C. W. Langley Flux (Flux, Son and Co.) appeared for the Council; Mr. W. L. Bell appeared for the defendant.

Mr. Langley Flux stated that the action was brought under the provisions of the Pharmacy Act, 1868, the penalties sued for being fixed by Sec. 15 of that Act. The defendant carried on the business of a chemist and druggist, although not qualified so to do.

Proof having been given of two purchases at the shop, styled the St. Luke's Drug Stores, in Bevois Valley, and that on both occasions the defendant was himself the seller, Mr. Bell admitted each of the purchases alleged in the particulars, and that defendant was the seller in each case. He submitted that there was a registered man in the business and that was all the Act required.

In answer to Mr. Langley Flux defendant admitted that he was in partnership with Mr. W. E. Moffat.

His Honour reserved judgment to the next court.

In delivering judgment on the 5th inst., his Honour said the action was adjourned in deference to some points raised by Mr. Bell, though at the same time he (the Judge) expressed himself that he had very little doubt as to the law on the subject. He had since taken the advantage of going carefully into the facts, and had come to the conclusion there was no answer to the action of any kind. His Honour quoted from the Pharmacy Act, to show its objects, and said he believed it to be one of the most useful Acts ever passed for the safety of the public. Every provision was made that it should be carried out literally. The defendant had admitted that he was not qualified, and the whole object of the Act was to prevent persons not qualified making up poisonous drugs. As to the suggestion of Mr. Bell as regarded the partnership it was provided for by Section 3, and defendant had not complied with that. He therefore gave judgment for the plaintiffs.

Mr. Bell: My point is that defendant had a partner who was qualified.

Judgment was entered for the plaintiffs for the penalties sued for with costs.

Obituary.

Notice has been received of the death of the following :—

On the 30th of October, Mr. Michael Charles James Harris, Chemist and Druggist, West Street, Axminster. Aged 70 years.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

ASSAY OF IPECACUANHA WINE.

Sir,—When I sent my paper on the "Assay of Ipecacuanha Wine" to be read at the late Conference I had operated upon the wine only, and certainly the results obtained justified the hope there expressed that the process might prove useful. I have since worked with aqueous solutions of emetine dissolved in a slight excess of acetic acid, and find that under these circumstances little or no re-solution of the mercuric iodide takes place. What may be the cause of the different behaviour of the wine residue and the aqueous solution I am at a loss to conjecture; it must be due to some constituent of the root, as the evaporated residue of sherry wine possesses no property of the kind. I write to prevent disappointment on the part of those who might otherwise investigate the capabilities of the process. THOS. P. BLUNT.

W.P.—According to the author of 'Pharmacographia,' "Scraped or decorticated ginger is often bleached either by being subjected to the fumes of burning sulphur or by immersion for a short time in a solution of chlorinated lime. Much of that seen in the grocer's shops looks as if it had been whitewashed, and in fact is slightly coated with calcareous matter, either sulphate or carbonate of calcium."

Test for Albumen.—A correspondent asks for the formula for Esbach's Solution used as a test for albumen.

Erratum.—On p. 348, col. ii., line 7 from bottom, the term suggested by Mr. Bird should be given as "bacteriad" instead of "bacterial."

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Wilson, Robertson, Corder, Tayler, Martindale.

THE SO-CALLED MUSSÆNDA COFFEE OF RÉUNION.*

[*Communication from the Research Laboratory of the Pharmaceutical Society.*]

BY PROFESSOR W. R. DUNSTAN.

A short time ago, Mr. Thiselton Dyer, the Director of Kew Gardens, suggested to me the desirability of making a chemical examination of a supposed substitute for coffee, concerning which a good deal has of late been heard in France. It has been stated, on the authority of M. Lapeyrère, a pharmacist residing in the island of Réunion, that the seeds of a plant abundant in the island, which he calls *Mussœnda borbonica*, known to the natives as "wild orange," closely resemble coffee berries, not only in appearance, but also in their chemical constituents, so that they may be regarded as a formidable rival to coffee. This announcement appears to have caused some scare in the coffee trade, and it is said that many inquiries for the seeds have been made. M. Lapeyrère's paper on the subject is printed in the *Bulletin Bimensuel de la Société Nationale d'Acclimatation de France* for 1888, pp. 285-300. It contains an account of the botanical characters of the plant, which are stated to differ from those of the known representatives of *Mussœnda*, and the plant is therefore adjudged by M. Lapeyrère to be a new species. The results of a chemical analysis of the unroasted seeds are recorded, from which it appears that they contain from 0·3 to 0·5 per cent. of caffeine.

An examination of the seeds at Kew revealed the fact that the plant in question is really a member of the natural order *Loganiaceæ*, named *Gœrtnera vaginata*, and not a new species of *Mussœnda*, which belongs to the *Rubiaceæ*. In a despatch to the Foreign Office, Mr. St. John, the British Consul in Réunion, corrects some misstatements regarding the plant which have been made in connection with its proposed employment as a substitute for coffee. Mr. St. John points out that the shrub is not plentiful in the island, that it yields fewer berries than the coffee shrub, the fruit growing only at the end of the branches. He further asserts that the *Gœrtnera* seeds are less fragrant than coffee, and would probably be more expensive.

These facts do not, however, affect the interest and importance attaching to the discovery of a new source of caffeine, and a possible substitute for coffee. M. Lapeyrère's statement that the seeds contain caffeine is not so remarkable when made in reference to a plant belonging to the natural order *Rubiaceæ*. In view, however, of the fact brought to light at Kew that the plant belongs to an entirely different natural order, *Loganiaceæ*, the statement becomes not only remarkable but improbable. A special search was therefore made, not only for caffeine but also for theobromine and other compounds belonging to the same family. In the first instance 150 grains of the very hard seeds were powdered, mixed with half their weight of magnesia, and made into a paste with water. This paste was dried and reduced to powder. Having been packed in a continuous extraction apparatus the powder, which would now contain caffeine in the free state, was successively exhausted with boiling chloroform, boiling alcohol, and finally with boiling water. The residues left by the evaporation of these solvents were examined for caffeine. The residue left by the evaporation of the chloroform, consisting largely of fat and resin, was extracted with dilute hydrochloric acid, and the acid liquid was tested with a solution of iodine and with Mayer's solution, in both cases with a negative result. Another part of the same liquid was oxidized with nitric acid, and the residue mixed first with a little ammonia and then with potash, but neither a red nor a violet coloration was observed, so that caffeine and theobromine were certainly absent. The alcoholic and aqueous residues were similarly dealt with, but here, again, no trace of caffeine or of any similar substance could be detected. Since a plant belonging to the *Loganiaceæ* might be expected to contain strychnine or brucine, each residue was tested for these alkaloids, but neither was found. In fact, at no stage of the inquiry was there found any evidence of the existence of an alkaloid in these seeds, unless, indeed, there is included the doubtful indications, afforded by the alcoholic residue, of the presence of choline or of a substance resembling it. The seeds contain, besides much proteid and a small quantity of sugar, a fat which seems to be similar in some respects to the fat contained in *Strychnos Nux-vomica*, but owing to our supply of the *Gœrtnera* seeds having failed, it could not be examined minutely. It may be remarked, in conclusion, that the seeds bear only a slight superficial resemblance to coffee berries. They are flatter and are further distinguished by carrying on both surfaces a series of deeply marked radiating lines.

It had been intended to publish the facts in reference to the botanical nature of "*Mussœnda* coffee," in the first instance in the November number of the *Bulletin* of information which is issued by the Kew Department. The notice was, however, crowded out of this publication at the last moment, and under these circumstances Mr. Thiselton Dyer generously placed at my disposal, for the purpose of this communication, the information which will now subsequently appear in the December number of the Kew *Bulletin*.

[*The discussion on this paper is printed on p.* 389.]

* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, November 13.

STERCULIA GUM: ITS SIMILARITIES AND DISSIMILARITIES TO TRAGACANTH.*

OCCURRENCE OF PARARABIN IN STERCULIA GUMS.

BY J. H. MAIDEN, F.L.S., F.C.S.,

Curator of the Technological Museum, Sydney.

The existence of a gum on species of *Sterculia* has long been known. It has been recorded from India, Africa and Australia, but, with the exception of Flückiger's research in regard to an African species, and some general experiments with the India *S. urens*, nothing appears to be known in regard to them. The object of the present paper is to record some experiments and observations on the gums of Australian and also of an Indian

* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, November 13.

species, in the course of which the author has discovered that they are composed essentially of *pararabin*, and also to show the incorrectness of the idea that they are similar to tragacanth, except in some superficial characteristics.

The author cannot at present see any commercial future before gum of the Australian species; the same conclusion has long since been arrived at in regard to those produced by India ones; in regard to an African species we have the experiments of Flückiger (*infra*).

INDIAN.

(Thirty-one species are described in the 'Flora of British India.')

Many Indian species yield gums, but that of *S. urens*, Roxb., is best known. It is obtained from cracks and incisions in the bark, and is mixed with that of *S. villosa*, and *Cochlospermum*, and sold under the name of "kalila" or "katira" (Brandis). It is used in India for making sweetmeats (*Cat. Kew Museums*). It exudes spontaneously during the hot season, and occurs in large, light-brown, transparent tough masses. Immersed in water these swell like a jelly, and do not dissolve but by protracted boiling. The solution is not adhesive, and is destitute of the thickness of solutions of ordinary gum. The uses of the gum are very limited; the want of adhesiveness renders it unsuitable for the arts, while its difficult solubility renders it inferior to most other gums for medicinal purposes (O'Shaughnessy, 'Dispens.'). From time to time samples have been sent to Europe for valuation, but hitherto no use has been found for it, and consequently it has no appreciable value in the markets. The only purpose for which it has hitherto been considered available is as an adulterant of tragacanth, but hardly as a substitute. Some samples either of this, or a very similar gum, have appeared in the London and Liverpool markets, and sold at a low price as false tragacanth and hog gum (Cooke, 'Gums and Resins of India,' where further particulars are given). Dr. Dymock (*Pharm. Journ.*, [3], viii., 161) says, "Placed in water it forms a firm, colourless, tasteless jelly, but on the addition of a large quantity [not unless heated, J. H. M.] it dissolves; the solution is precipitated by acetate of lead. It is used as a substitute for tragacanth, and is issued from the Government stores." It would be interesting to know to what use the gum is put after issue, but the same author's 'Materia Medica of Western India' throws no light on the subject.

Following are two extracts from a 'Descriptive Catalogue of the Gums and Resins in the Technological Museum,' which is nearly ready for the press.

Cochlospermum Gossypium, D. C. Kuteera or False Tragacanth. *Sample I.*—Received from Kew. A translucent, horny-looking, shrivelled gum, in irregular pieces as large as walnuts. It is of a dull dirty whitish, yellowish or brownish colour, and attached to it are fragments of bark, some of it lace-bark (? sterculiaceous). To say that it is tragacanthoid describes its lustre. It is without taste. It might be used (if that *be* a use) as an adulterant, but not as a substitute for low-grade tragacanth, for it has not the adhesiveness of the latter gum. Mr. Baden-Powell (quoted by Cooke) states that it is used in shoe-making in India. If it has any adhesiveness at all in India, it would be worth while to inquire whether it is employed as a substitute for tragacanth in cementing the "wrappers" of Indian cigars. Waring ('Pharm of India') speaks of it as an article of very minor importance. From India (N. W. P). *Sample II.*—A beautiful selected translucent sample, resembling chalcedony. On tasting it, it was found to be quite acid, and on smelling, the bottle was found to be strongly charged with acetic acid.* As far as the samples in the Museum go, it appears to hold good that the paler the specimen, the more acidulous it is. From Calcutta. *S. urens*, Roxb.—Received from the Government of India. I cannot at present detect any difference in appearance between this gum and that of *Cochlospermum gossypium*. I have even transposed the labels, and then have failed to separate the gums, except by guess-work. Some of the pieces taste slightly sour, as mentioned under cochlospermum. Digested in water it swells up and dissolves but slightly. It appears, however, to make a bulkier jelly than cochlospermum, but this difference may be only apparent, owing to the specimens not having been judiciously chosen. Guibourt discusses the subject (Cooke, 'Gums and Resins of India,' p. 30; *Pharm. Journ.*, xv., 58), and arrives at the conclusion that the two trees produce identical gums. Its chemical deportment is the same as that of *S. rupestris*, and the experiments related under the head of that gum (as also the description of its behaviour in water) apply here exactly.

Dr. Thomson says the gum of *S. urens* has been used by calico-printers (*sic*), and in his 'System of Chemistry,' makes this particular gum a sub-division of the gums, as precipitable by a solution of silica (Gmelin).

There can be little doubt but that the following gum is attributable to *S. urens*, and the excerpt is interesting as giving a further description, and as placing the objections to its use in another form. The gum had been purchased by a calico-printer in ignorance. "It was in large brown-coloured and wrinkled translucent pieces, having a certain degree of softness; so that they could not be pounded in a mortar. When put into water they did not dissolve, but gradually imbibed the water and swelled out into a jelly, so nearly colourless that its presence at the bottom of the vessel containing water was not perceptible till the water was agitated by moving the vessel. When boiled for some hours with water this jelly completely dissolved. But the water was not mucilaginous, like a solution of gum-arabic, nor had it the least adhesive property. . . Thus this substance, though resembling gum in its appearance, possessed none of the properties of that substance, and could not be employed to thicken acids or colours intended to be printed on cloth. . . There is reason to suspect that it came from India" (Thomson, 'Chemistry of Organic Bodies, Vegetables,' p. 676).

Following are the other oriental species yielding gum, as far as known to the author:—

S. campanulata, Wall. "Exudes a gum resembling tragacanth" (Kurz).

S. ornata, Wall. "Exudes gum" (Kurz).

S. fœtida, Linn. "Exudes gum resembling tragacanth" (Kurz).

S. villosa, Roxb. "Gives a white pellucid gum

* This was long since pointed out by Guibourt ('Hist. des Drogues;' *Pharm. Journ.*, xv., 53).

which exudes copiously from cuts in the bark (Gamble, Brandis). This gum bears the same local name as the produce of *S. urens*.

S. ramosa and *S. piperifolia*, from Pegu, are said by Balfour ('Cyc. of India') to yield gum, but I cannot at present trace these names. It may be that they are synonyms.

AFRICAN.

(Seven species are described in the 'Flora of Tropical Africa.')

S. Barteri, Mast. (*op. cit.*, 219), is reported to have "resinous" bark, but this is probably an instance of the commonly loose way in which the words "gum" and "resin" are used. A "whitish gum" exudes from the follicles of an undetermined species.

S. Tragacantha, Lindl. Lindley calls this the "gum tragacanth of Sierra Leone." According to Lock (Spon's 'Encyc.'), it bears the closest resemblance to the produce of the Indian species of *Sterculia* just described, as is seen, indeed, from Dr. Flückiger's description. Lock states that it is formed in great quantity, and commonly finds its way into parcels of Senegal gum. If Flückiger's conclusions as to its utility are justifiable, it is singular that it has not come into use, but the present writer can find no further allusion to it anywhere.

The following notes on "African Tragacanth" from this species are abstracted from a paper by Dr. Flückiger (*Pharm. Journ.*, [2], x., 641).

The substance experimented upon consisted of "irregular, knobby, undulated, droppy, or stalactitic masses, more or less bubbly or cavernous, often exceeding an ounce in weight, of a pale yellowish hue or almost colourless, in small fragments, nearly transparent, but seen in mass somewhat opaque by reason of innumerable cracks, which also render it more brittle than true tragacanth. Each mass is, in fact, traversed by curved fissures answering to successive protrusions of gum. Fragments of bark are often adherent to the flat or inner side of the pieces.

"With twenty parts of water coarsely powdered African tragacanth forms, like common tragacanth, a thick, tasteless jelly; with forty parts of water the jelly becomes more fluid. Only a very small quantity of gum is really dissolved in the water; the filtered liquid is not precipitated either by neutral acetate of lead or by absolute alcohol,* but on addition of basic acetate of lead it becomes a little turbid. The jelly itself reddens litmus paper. Neither thin slices of the dry tragacanth nor the jelly exhibit any trace of cellular structure, or of starch, even when examined in polarized light by means of a microscope. In this respect the tragacanth of *Sterculia* differs from that of *Astragalus*. As a means of promoting the adhesiveness of pilular masses, I find the former, whether in the form of powder or mucilage, as advantageous as ordinary tragacanth.

"The fine powder on exposure for some days to a temperature of 212° F., loses 20·5 per cent. of its weight. The formula $C_{12}H_{22}O_{11}+5H_2O$ would exactly require 20·5 per cent. of water. . . . . Upon incineration, the dried powder leaves 7·8 per cent. of ash, of which the prevailing constituent is carbonate of calcium. . . . . ."

* The formation of a ppt. by this reagent is rendered almost impossible in such dilute solution.—J. H. M.

Dr. Flückiger then reports the result of an ultimate analysis of the gum, heated in a tube with cupric oxide in the usual manner. He declines to express an opinion as to the proximate constituents of the gum. I have referred to this portion of his experiments below, showing how near he was to the determination of its chief component. He sums up his opinion of its commercial value in the following words: "I infer that the African Sterculia tragacanth may be used both in pharmacy and in the arts, instead of the usual drug of Asia Minor."

AUSTRALIAN.

Bentham, 'B. Fl.,' 226, makes twelve species, divided into two sections, *Sterculia* and *Brachychiton*, Mueller, 'Cens.,' 15, erects these sections into distinct genera, adds a new species to each, and rejects *S. fœtida* as Australian.

Baron Mueller says (*teste* Blackett, *Chem. and Drug.*, Austral. ed., 1882, p. 100), "I have noticed gummous exudations from all the Brachychitons in Australia." The present writer has never heard of any from Australian species being described more fully than as being "like tragacanth."

S. diversifolia, G. Don, 'B. Fl.,' i., 229 (*Brachychiton populneum*. R. Br. in Muell. 'Cens.,' p. 15). Found in Victoria, New South Wales and Queensland. A "Kurrajong."

In the Clyde River district of New South Wales, a correspondent of the writer came across a tree about 1 foot in diameter and 30 feet high. About a bucketful of gum was found at its foot, on the ground, naturally exuded and partly viscid. Enormous tears of the gum had flowed down the stem and were adherent to it.

I have received a quantity of gum of this species from Baron von Mueller. It cannot be distinguished, by any physical characteristic, from the Indian gums *S. urens* and *Cochlospermum Gossypium* already described. It only differs from the gum of *S. rupestris* (*infra*) in being in rounded tears, whereas the latter was much broken, and splintered when received.

S. rupestris, Benth., 'B.Fl.,' i. 230 (*Brachychiton Delabechii*, F. v. M. in Muell. 'Cens.,' p. 15, *Syn. Delabechea rupestris*). Found in Queensland. A "Kurrajong." Called also "Bottle-tree" or "Gouty-stem."

Delabechia rupestris.—"When boiling water is poured over the shavings of this wood, a clear jelly, resembling tragacanth, is formed, and becomes a thick viscid mass; iodine stains it brown, but not a trace of starch is indicated" (Sir Thomas Mitchell's 'Journal of an Exped. into the Interior of Trop. Australia, &c.,' p. 155. These remarks are signed by J. L.—Dr. Lindley.

A specimen of the naturally exuded gum in the Technological Museum is remarkably like paraffin in appearance, and almost as free from colour. It is rather tough and horny, and breaks with a dull fracture. In the mouth I fail (except in the shape of the pieces) to detect any difference between it and tragacanth. It is in irregular pieces, full of angles and points, the result of the fusion of innumerable tears.

A mass swells up readily in water and then disintegrates. The insoluble portion has a granular appearance similar to that which pearl-sago of exceeding fineness assumes under similar circumstances.

The jelly is of snowy or rather icy whiteness, freer from colour than the jelly yielded by the best isinglass, and of enormous bulk when the absorption of water is complete.

This gum and tragacanth present many points of difference. Their closest similarity is in outward appearance. *Sterculia* gum does not thicken water, except to a barely appreciable extent, and therefore could not have the economic uses to which the very viscid tragacanth is put. On treating the gums with cold water, a difference between them is the more bluish opalescent appearance of tragacanth, and the granular appearance of the mucilage afforded by *Sterculia*. But these gums may be at once distinguished by the canary-yellow colour yielded by adding caustic soda to mucilage of tragacanth and boiling, no coloration being observable in the case of *Sterculia* gum.

The author then repeated the whole of Giraud's experiments on tragacanth, as detailed in *Pharm. Journ.*, [3], v., 766; viii., 773, and he may at once state that he obtained with tragacanth all the general results recorded by that chemist. He then repeated the experiments, with substitution of *Sterculia* gum for tragacanth, and he presents his results in the form of comparative statements :—

Similarities.—Qualitative.

1. Horny texture.
2. They swell enormously in water.
3. The jellies redden litmus.
4. They dissolve on prolonged boiling in a large quantity of water.
5. They dissolve on boiling in dilute hydrochloric acid.

Quantitative.

6. They contain about 20 per cent. of water.

Dissimilarities.—Qualitative.

	Sterculia.	Tragacanth.
7. In cold water.	*a.* Colourless. *b.* Granular jelly. *c.* Adhesiveness absent or very small.	*a.* Opalescent. *b.* Smooth viscid mass. *c.* Adhesive.
8. Boiling in dilute alkali.	Insoluble.	Almost entirely dissolves.
9. Caustic soda and warming.	No change of colour.	Canary-yellow colour, which fades on cooling.
10. Boiling in dilute acid.	Soluble, forming arabin [J. H. M.].	Soluble, forming pectin [Giraud].
11. Alcohol added to liquid formed in (10).	Whitish precipitate. (See fuller statement).	Formation of floating glairy mass.

Most Indian specimens of *S. urens* smell a little of acetic acid; tragacanth never does, as far as the author's experience goes.

The author is responsible for all the results in which names are not given in brackets.

EXPLANATORY NOTES ON SOME OF THE RESULTS RECORDED IN THE FOREGOING TABLES.

No. 14. "Some tragacanth was digested with fifty times its weight of water containing 1 per cent. of hydrochloric acid in a water-bath until dissolved; it was then filtered and excess of baryta water added. The precipitate, which formed slowly, was pectate of baryta. When of a suitable consistence, this was washed, suspended in water and treated with excess of hydrochloric or acetic acid, which left a precipitate of pure pectic acid. As the result of numerous determinations, it was found that by this method about 60 per cent. of pectic acid can be obtained from gum tragacanth" (*Pharm. Journ.*, [3], v., 766; vii., 773). On repeating these experiments with tragacanth the results were as indicated by Giraud. After some little time there was formed on addition of baryta water in excess, a whitish or opalescent precipitate of pectate of baryta, very similar in appearance to weak mucilage of tragacanth. The precipitation was complete in forty-eight hours. Sterculia gum substituted for tragacanth gave negative results.

Quantitative.

	Sterculia.	Tragacanth.
12. Specific gravity.	*S. urens*, 1·49. *S. diversifolia*, 1·472.	1·384 [Watts' 'Dict. and Encyc. Britt.'].
13. Soluble gum.	Arabin (chiefly). *S. urens*, 3·14 p. c. *S. diversifolia*, 9·88 p. c. *S. rupestris*, 6·9 p. c.	"A mixture of different bodies, and not a definite principle, like arabin." 8–10° per cent. [Giraud]. 7·7 p. c. (J. H. M.)
14. Insoluble gum.	Pararabin. *S. rupestris*, 63·42 p. c. *S. diversifolia*, 61·74 p. c. *S. urens*, 75·1 p. c.	"Pectic compound." 60 p. c. [Giraud].
15. Starch	None.	2–3 p. c. [Giraud].
16. Ash.	*S. rupestris*, 9·0 p. c. *S. diversifolia*, 8·195 p. c. *S. urens*,* 5·83 p. c. *S. tragacantha*, 7·8 p. c. [Flückiger]. *The author finds 5·46 p. c. of ash in *Cochlospermum Gossypium*.	3 p. c. [Giraud]. 3·24 p. c. (mean of some experiments by J. H. M.). The author believes in the general accuracy of Giraud's figures, but the difficulties of making an accurate determination are enormous. This explains the fact that no two observers obtain the same figures.

No. 11. Addition of alcohol to dilute acidulous solution.

Sterculia.—The liquid becomes cloudy throughout its whole bulk, behaving in much the same way that a weak solution of arabin would if similarly treated. It is, in fact, found to be arabin.

Tragacanth.—A glairy substance is formed, the transparency of the liquid being scarcely impaired.

On standing this jelly-like body rises to the top of the liquid. This is pectin, according to Giraud.

Table Showing the Average Composition of Sterculia Gums.

	Rupestris.	Diversifolia	Urens.
Soluble in cold water (chiefly arabin) .	6·9	9·88	3·14
Pararabin	63·42	61·74	75·1
Moisture	20·52	20·2	16·6
Ash	9·015	8·195	5·83
	99·855	100·015	100·67

The author's discovery of pararabin in *Sterculia* gum really confirms Flückiger's figures obtained by combustion of the gum of *S. Tragacantha* (*Pharm. Journ.*, [2], x., 642). His percentage results are practically identical with the generally accepted figures for arabin, *ergo*, for pararabin, and his experiments are additional evidence to show the general similarity of *Sterculia* gums. The adhesiveness of that of *S. Tragacantha* is very remarkable, and further information on the subject is desirable. It would be particularly interesting to know the percentage of arabin.

Pararabin, like metarabin, is of course a modification of arabin. While metarabin is converted into arabin by treatment with dilute *alkali*, pararabin is similarly converted by treatment with dilute *acid*. They both are insoluble, but swell up in cold water. A solution of pararabin in weak acid is precipitated by alkalis.

Pararabin is usually obtained from beet or carrot pulp. It constitutes the Chinese vegetable jelly (agai-agai), or Ceylon moss (*Gracilaria*), according to Reichardt (Watts' 'Dict.,' 3rd Supp., Pt. 1., p. 119; Roscoe and Schorlemmer, iii., 2, 571). The present writer took a sample of agar-agar, together with a *Gracilaria* found in Australian waters, and a sample of the Japanese "kanten," said to be obtained from a tea-weed (*Gelidium corneum*). He found them all to consist *mainly* of pararabin, but, unlike *Sterculia* gums, and like tragacanth, he found that caustic alkali produced a canary-yellow colour when boiled with them. He also observed (and in this respect these substances differ from both *Sterculia* gum and tragacanth), that when baric hydrate is added in the cold to a solution in weak hydrochloric acid, a canary-yellow colour was produced on standing for a few hours. He has not pursued the subject further in this paper, as being, to some extent, a digression.

[*The discussion on this paper is printed on p.* 390.]

CASTOR OIL ADULTERATION.*

BY MICHAEL CONROY, F.C.S.

It would be difficult to name a business where the art of adulteration is practised to the extent that it is in the oil trade. Castor oil, however, is one of the oils that is less subject to adulteration than perhaps any other that is imported, but there has recently been received in Liverpool from Calcutta more than one shipment, numbering several hundred cases bearing the usual marks, which has been found on examination to be adulterated with cocoanut oil to the extent of from 20 to 30 per cent.

Castor oil, owing to scarcity of seed, has recently advanced over 50 per cent. in value, and it is no doubt due to this cause that we find this somewhat novel sophistication. The choice of a substance like cocoanut oil seems very absurd, but we should remember that at the temperature of the Indian climate this oil would be quite liquid, and the fact that it would become solid on its arrival in England would probably not present itself to the native mind. It is this characteristic that first drew attention to the matter, for it was found that this particular lot of castor oil began to become semi-solid on standing a few days after landing.

As it is possible that some of this adulterated oil may find its way into pharmacy, I have thought it worth while to bring these facts forward, and to give the results of my experience as to the best means of detecting and estimating the adulterant.

The test given in the British Pharmacopœia is that it is "entirely soluble in one volume of absolute alcohol and in two volumes of rectified spirit." Now this test is quite useless for the detection of cocoanut oil or any other possible adulterant, because oils that are insoluble in both absolute alcohol and rectified spirit are soluble in a mixture of either with castor oil, and I have prepared samples of castor oil containing 10 to 20 per cent. of cocoanut oil which are as freely soluble in these solvents as is castor oil itself. On the other hand, I have never yet met with a sample of castor oil, one volume of which would dissolve in two volumes of rectified spirit of the Pharmacopœia strength, viz., specific gravity ·838, at 60° F. With the thermometer at 70° to 80° F. solution does take place, but not at 60° F. With spirit of specific gravity ·830, one volume of castor oil dissolves perfectly in two volumes at 60° F., so that it will be seen, that by either increasing the temperature, or by using spirit a few degrees stronger, solution does take place; but even with this alteration the test will only serve, as has been already shown, to detect adulterants outside of certain limits. Castor oil is also soluble in glacial acetic acid, while all other fixed oils, with the exception of croton oil, are insoluble. This test is given in some works, but I find the same objection to it that I have previously mentioned in connection with the Pharmacopœia test, for notwithstanding the fact that other oils *per se* are insoluble, they are rendered soluble when mixed with castor oil within certain limits.

The chief distinguishing features of castor oil are undoubtedly its high density and its insolubility in petroleum ether (benzolene) when compared with other fixed oils. We find it stated in text books that castor oil is insoluble in petroleum ether, of which, however, it has the peculiarity of dissolving its own volume. This statement is not correct, for I shall show you that castor oil is to a certain extent soluble; also, that under a certain temperature castor oil will not dissolve its own volume of petroleum ether.

This latter feature, I find, affords trustworthy proof of the presence or absence of any other fixed oils.

The following experiment was made with samples of East Indian, French and Italian castor oil, each

* Read at a meeting of the Liverpool Chemists' Association, November 7, 1889.

giving practically the same result. The petroleum ether used had a specific gravity of ·7033 at 60° F.

Twenty c.c. each of castor oil and petroleum ether were mixed by brisk agitation in a tall graduated tube and maintained at a temperature of 60° F.

The mixture never became clear, and on standing for about an hour, a layer of petroleum ether collected on the surface measuring 3 c.c. This, as we shall shortly see, has a very important bearing, and it should be borne in mind that the same experiment was tried on many samples from various sources, and that never in any instance at a temperature of 60° F. did a clear mixture result, and in all cases, a separation of petroleum ether took place on standing, amounting to practically the same volume. If on the other hand the mixture be made at a temperature of 70° F. the whole of the ether is dissolved, or if the mixture made at 60° F. be shaken and raised to 70° F. perfect solution takes place, but on cooling again to 60° F. the same amount of separation occurs.

Thus far we have seen the behaviour of petroleum ether with genuine castor oil, and we shall now see how it behaves with adulterated samples. For this purpose samples were made each containing 5 per cent. of one fixed oil, such as cotton-seed, cocoanut, etc.

These samples *in all cases* made a perfectly clear solution with an equal volume of petroleum ether at 60° F., and in no instance did any separation take place on standing.

We thus see that so small an amount as 5 per cent. of a fixed oil, other than castor oil, when present is sufficient to cause the whole of the petroleum ether to combine and form a perfectly clear solution, and I think that it has clearly been shown that the test is a reliable and a safe one.

So far I have only made use of this as a qualitative test, but I have hopes that by adopting certain precautions it can be made a quantitative one, for I find that if two volumes of petroleum ether be used instead of one, and thoroughly mixed by agitation at a temperature of 60° F., separation takes place in the adulterated as well as in the pure samples, and that the volume of the ethereal layer increases with the amount of adulterant present with a corresponding diminution in the lower castor oil layer.

To demonstrate this, I have here three tall, graduated tubes of 60 c.c. capacity.

No. 1 contains 20 c.c. of pure castor oil and 40 c.c. of petroleum ether.

No. 2.—20 c.c. of castor oil containing 10 per cent. of cocoanut oil and 40 c.c. of petroleum ether.

No. 3.—20 c.c. of castor oil containing 20 per cent. of cocoanut oil and 40 c.c. of petroleum ether.

These, on being well mixed by agitation and allowed to rest, separate into portions varying with the amount of cocoanut oil present in the samples, as shown in the following table :—

	Bottom or castor oil layer.	Petroleum ether layer.	Total measurement.
No. 1	36 c.c.	24 c.c.	60 cc.
No. 2	33½ „	26½ „	60 „
No. 3	30½ „	29½ „	60 „

I have already referred to the statement found in text-books to the effect that castor oil is insoluble in petroleum ether, and promised to demonstrate that such was not the case. No. 1 sample proves my contention, for I have already shown that in mixing 20 c.c. each of castor oil and petroleum ether, 37 c.c. of the castor oil mixture separates, whilst in this last experiment (No. 1 in table) only 36 c.c. of the castor oil mixture is left, showing that the extra 20 c.c. of petroleum ether has taken up some of the castor oil, and the decrease in Nos. 2 and 3 is undoubtedly due to the fact that the cocoanut oil is dissolved out by the petroleum ether. This can be demonstrated by drawing off the upper layer and driving off the petroleum ether, when the cocoanut oil containing some castor oil will be left.

It must be remembered in reading this table that the lower stratum is a mixture of castor oil and petroleum ether in nearly equal portions, and that the diminution in bulk in Nos. 2 and 3 is due not only to the abstraction of the cocoanut oil by the petroleum ether, but also to the fact that there is that much less castor oil in the sample to combine with the ether, so that the lower portion will show a decrease in volume from these two causes and the upper one a corresponding increase.

I have not tried this experiment with a sample containing more than 20 per cent. of cocoanut oil, because with this percentage of adulteration the separation of the two layers is very slow. This is due to the peculiar solvent action already referred to in connection with the alcohol test, where a solvent has the power, in combination with a substance which it freely dissolves, to take up a third substance which, without the aid of the second, it could not dissolve. Therefore a sample containing much more than 20 per cent. of cocoanut oil or other adulterant would in conjunction with the petroleum ether carry the castor oil into solution.

As a quantitative test, my experience of this method is only of a few days standing and I do not wish too speak too dogmatically upon it, but I do think that if carefully carried out at a temperature of 60° F. it is capable of yielding very trustworthy results.

I have alluded to the high density of castor oil as being one of its distinctive characteristics, and in this instance, where the adulterant is cocoanut oil, it is possible to arrive at the percentage of adulterant present by the specific gravity process quite as accurately as by either the saponification equivalent or the iodine absorption test, and with far greater facility.

The specific gravity of castor oil at a temperature of 60° F. is ·964. I have never found any higher, and the lowest that I have met with was a sample of French oil which gave ·9625 at the same temperature. There is a greater range than this given in text books but I much doubt their accuracy, and in my experience ·963 to ·964 is the correct density for genuine oil. When castor oil is adulterated with 10 per cent. and over of cocoanut oil, the latter separates when the temperature falls to 60° F., and it becomes necessary in such cases to take the density at a higher temperature. I have therefore taken a sample of castor oil possessing a density of ·964 at 60° F. and found its density to be ·949 at 100° F. A sample of cocoanut oil at the same temperature (100° F.) I found to be ·912. Both densities were taken by means of an accurate 1,000 grain bottle. From this it will be seen that

the difference between the two densities is sufficient to enable one to arrive at a very accurate estimation, by a very simple calculation, of the amount of cocoanut oil present.

In the first place it is of course necessary to ascertain the presence of cocoanut oil, and this can be done by heating the sample under examination in a small porcelain dish, when the distinctive odour of cocoanut oil can readily be ascertained. By this plan the presence of even 1 per cent. can be detected, and 5 per cent. is quite distinctive to anyone possessing an ordinary sense of smell.

I have heard within the last few days that some castor oil has reached Glasgow, which, on examination, was found to be adulterated with cotton-seed oil.

The adulterant is probably what is known as "blown" cotton-seed oil, which is made by blowing warm air through the oil. Great heat is thereby developed, and the oil increases in density and viscosity.

The presence of this oil can be detected by my modification of the nitrate of silver test, which is applied as follows :—

1. Make a test solution containing five parts of silver nitrate and one part of nitric acid (specific gravity 1·42) in one hundred parts of rectified spirit (specific gravity ·838).

2. Pour about 100 grains of the oil under examination into a dry test tube, about half-an-inch in diameter, add to it 10 grain measures of the above test solution, and place the tube in *boiling* water for five minutes.

Castor oil assumes a pale yellow colour, but the presence of cotton-seed oil causes it to become deep red.

In conclusion, I would just add that the quantitative petroleum ether test is capable of much further development, but being tied for time I have not had an opportunity of fully working it out.

PERFUME OF THE ROSE.

In an elaborate article on this subject in the *Bulletin* of the French Botanical Society M. R. Blondel states that the odour of the rose is chiefly developed in the group *Centifoliæ*, and especially in *R. centifolia*, Mill. The group *Caninæ* possess a similar perfume, which is, however, generally much more feeble. The hybrids produced by crossing tea-roses (*R. fragrans*, Riv.) and Bengalese roses (*R. semperflorens*, Curt.) with *R. centifolia* give a great variety of odours; while the noisette roses (hybrids of *R. moschata* and *semperflorens*) are generally scentless. In the group *Banksiæ*, *R. Banksia alba* possesses a very pronounced odour of violets, while *R. Banksia lutea* has no marked perfume. The group *Cinnamomeæ*, with one or two exceptions, do not possess a strong odour, and the *Pimpinellifoliæ* are likewise nearly scentless. In the group *Villosæ* the flowers have but little perfume, but the leaves are glandular, and in *R. villosa*, L., emit a terebinthaceous odour. The section *Rubiginosæ* (sweet-briars) are also remarkable only on account of the peculiar perfume emitted by the leaves of several species. In the petals of the fragrant species the essential oil resides in the cells of the upper and under epiderm; its presence may be easily detected by the use of osmic acid.

M. F. Crépin confirms the statement that the odour contained in the glands of the sweet-briar, *R. rubiginosa*, L., and of the species nearly allied to it, is totally different from that of the other species of the genus.

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THE SALE OF POISONS BY UNQUALIFIED PERSONS.

THE action brought by the authority of the Council of the Pharmaceutical Society, and at the instigation of Mr. BRAXTON HICKS, the Coroner for one of the divisions of the County of London, was heard last Tuesday before Judge HOLROYD at the Wandsworth County Court, and a report of the case will be found on page 397. The circumstances which led to this action have already been stated in this Journal and as the decision given is that the provisions of the 1st and 15th sections of the Pharmacy Act apply to all sales of poison by unqualified persons, whether masters or servants, it will be obvious that additional caution must be exercised by chemists in the sale of poisons so as to avoid the liability of their apprentices or unqualified assistants to proceedings of a similar nature. Some inconvenience will no doubt be experienced in certain instances from the adoption of these necessary precautions, chiefly in the case of those who do not employ a legally qualified assistant. In the event of their absence at any time from their business, the only alternative will be to prohibit the sale, dispensing or compounding of any scheduled poison during their absence. With those who have besides apprentices a legally qualified assistant the inconvenience will be less; but it will be essential even then that every sale, dispensing or compounding of scheduled poisons shall be conducted under the immediate supervision of a legally qualified person, either the master or his assistant. These precautions are suggested as being at least advisable under existing conditions. The interpretation of the Pharmacy Act by Judge HOLROYD may become the subject of consideration by a higher court, and it was even suggested by the judge that such a proceeding was desirable; but until his decision has thus been modified or reversed it must be taken as an interpretation of the law. It must also be remembered that although this case is regarded as raising a new point, and as being the first action taking by the Pharmaceutical Society in that direction, such a view of the matter is not strictly correct. There have been similar cases, but some of them have not come into court because the

penalties incurred have been paid on application, and consequently there could not be any publication of the fact. Moreover, it must be pointed out that the point raised in the case brought before Judge HOLROYD is not by any means a novel one, for it was incidentally the subject of a very precise expression of opinion by Lord Chancellor SELBORNE in the judgment delivered by him in the case of the London and Provincial Supply Association, and that opinion was distinctly in accordance with the decision of Judge HOLROYD. In dealing with the main argument urged in the appeal on behalf of the Pharmaceutical Society, that the object of the Pharmacy Act would be defeated unless a corporation as well as an individual were included, the Lord Chancellor held that this argument could not be sustained, because in the 1st and 15th sections the act of selling, the act of compounding, and every other act there mentioned is struck at, whether done by the principal to whom a business belongs, or by the person whom he employs to carry on the business. Whatever uncertainty there might be in this respect as to the words "keeping open shop," he held there was none as to the word "sell," nor any ground for extending to sale, as mentioned in the 1st and 15th sections, the special construction of the 17th section. Finally he added that regard to the mischief which the Act was intended to prevent, necessarily led to the same conclusion, "that he who sells, whether he be the principal or the person delegated to conduct and manage the sales, is struck at by the 15th section, because otherwise a very wide door would be open to all the things which the Act is intended to prohibit."

This authoritative interpretation of the provisions of the Pharmacy Act in regard to the sale of poisons dates back to the year 1880, but it is an important coincidence that the decision given by Judge HOLROYD last Tuesday was literally couched in the very same words that were made use of by Lord Chancellor SELBORNE, "the person who sells, whether he be the master or servant, is struck at by the 15th section." It will therefore be seen that, apart from this recent decision, there is strong antecedent reason for the recommendation we have offered as to the sale, dispensing or compounding of scheduled poisons. Other opinions, pointing in the same direction, though perhaps less explicit, might be referred to as having been expressed in the course of the debate in the House of Lords upon the Pharmacy Act Amendment Bill. In TRAFFORD'S case a very similar view of the Act was taken by Justices GROVE and LOPES, although that was a prosecution under the 17th section. The question was, who was the seller, the woman who handed over the article, the unregistered proprietor of the shop where it was sold, or the registered chemist living at some distance, whose name and address was on the label? Justice GROVE held in this case that the seller did not mean the registered chemist who lived at some distance from the shop, because he could not carry on the business or comply with the provisions of the statute, but the seller was, in his opinion, the person who actually conducted the business of sale and of the shop, though he by no means said that his should necessarily be the hand to sell the poison. Here the conduct or control of a sale of poison by a registered person was held to cover the actual handing over by the hand of an unregistered person, and the judgment delivered to that effect may serve to mitigate the anxiety that will be felt as a consequence of the recent decision. But obviously the supervision or conduct of the sale of poisons must be really active, and not merely figurative, in order to make the handing over lawful according to the provisions of the Pharmacy Act. It requires the presence of the legally qualified person while every sale is made and his actual participation in its conduct.

A good deal of misconception has arisen in regard to what is a lawful sale of poison from attaching too much significance to the idea that the qualification of the principal of a business is the all important requisite. No doubt the qualification and chief responsibility of the principal were objects which the founders of the Pharmaceutical Society considered of the highest importance. But it must be remembered that with this opinion was associated the desire to establish another grade of qualification for assistants. That was the original aim of the Society. It has, however, been only partially realized. By the passing of the Pharmacy Act, 1868, only one of those grades of qualification was recognized, and that was the lower grade that had been designed to apply to assistants. In point of fact the higher qualification that was contemplated as suitable for principals has been cast to the winds, except as a matter of voluntary action, so that it scarcely counts as being of much value from a practical point of view. There is therefore the less reason for insisting upon the present legal qualification as being sufficient for all purposes. That might have been more justly contended for if the higher grade of qualification had been adopted in the Pharmacy Act, though even that would have been only a partial carrying out of the original objects of the Society. The present action taken by the Council may be regarded as a step in the direction of protecting the interests of legally qualified persons and while in that light it should meet with approval and support, it should be remembered that since it rests with the Council to take the initiative for enforcing the interpretation of the law which has proved acceptable to legal authorities there need not be any apprehension that this will be done without adequate regard for the interests of the body it represents.

We wish to draw attention to the official announcement on our front page, from which it appears that there is now a vacancy for one worker in the Research Laboratory. In this Laboratory the Pharmaceutical Society provides, free of expense, opportunities for pharmaceutical chemists and other qualified persons to assist in or to pursue on their own account investigations in chemical pharmacology.

In a communication to the Medical Society last week, Sir Joseph Lister gave in some detail his present views as to the best material for the impregnation of antiseptic dressings. It will be remembered that about five years ago he introduced what was known as the sero-albuminated gauze, the active ingredient of which was prepared by dissolving mercuric chloride in blood serum. Subsequently, the double salt of mercury and ammonium was found to give with blood serum a compound that was more powerfully antiseptic and at the same time less irritating, but this was open to the objection that it was too soluble and was washed out by the discharge. At the suggestion of Mr. Martindale experiments were then made with cyanide of mercury and this in its turn gave way to a compound described in Watts's 'Dictionary' as a double cyanide of mercury and zinc. The material now used for impregnating gauze is a mixture of this double cyanide with starch and potassium sulphate, and as this product, though strongly inhibitory, is not germicidal, the gauze before being used is moistened with a 1 in 4000 solution of mercuric chloride to destroy any germs that it may be carrying. A further communication is promised, giving details as to the approved method of preparing the new dressing, and when this has appeared, it is proposed to make further reference to the subject.

* * *

We are pleased to be able to say that the Conversazione of the Chemists' Assistants' Association, which was held at the Portman Rooms, Baker Street, on Thursday evening, was of a highly successful character. The exhibits far surpassed in excellence and variety those of previous years, and judging by the number of members, patrons and visitors present, this popular reunion seems to lose none of its ancient prestige. Some four hundred attended.

* * *

It may be useful to point out that section 26 of the Revenue Act, 1889, prohibits the sale of methylated spirits between the hours of 10 o'clock on Saturday evening and 8 o'clock on the following Monday morning. We understand that a notice to that effect is to be served forthwith on every retailer of methylated spirits.

* * *

We are informed that a meeting of the Chemists and Druggists of Northumberland and Durham will be held in the County Hotel, Newcastle, on Wednesday evening, November 20, at 8 o'clock, to receive the report of the Committee appointed, on February 13th, to ascertain the mode of working of the Patent Medicine Act, and to decide upon future action.

* * *

A meeting of the Midland Counties Chemists' Association will be held at Mason's College, Edmund Street, Birmingham, on Tuesday evening next, at 8.30, when a paper will be read by Mr. R. A. Cripps, and Mr. Liverseege will demonstrate a method of ascertaining the amount of Carbonic Acid Gas in the Air of the Lecture Room.

* * *

The next meeting of the Chemists' Assistants' Association will be held on Thursday, the 21st inst., when a paper on "Oleate of Mercury," by Mr. R. C. Harrison, will be read.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, November 13, 1889.

MR. MICHAEL CARTEIGHE, PRESIDENT, IN THE CHAIR.

The second ordinary meeting of the session was held on Wednesday, the 13th inst., the chair being taken by Mr. Michael Carteighe, the President, at 8 o'clock.

The first paper, which was a contribution from the Research Laboratory, was on—

THE SO-CALLED MUSSÆNDA COFFEE OF RÉUNION.

BY PROF. DUNSTAN.

The paper is printed at p. 381, and gave rise to the following discussion.

The PRESIDENT said this paper was rather unsatisfactory for the purpose of discussion, the results being purely negative, but such results involved a considerable amount of labour and skill, and if anyone would like to ask for further information Prof. Dunstan would be happy to afford it. It was perhaps one of the advantages of a Research Laboratory that substances of this kind, which were stated to have properties of great commercial value, could be quickly examined and the results promptly published.

Mr. HOLMES said it might appear rather curious at first sight that a French pharmacien should mistake a member of the natural order Loganiaceæ for one of the Rubiaceæ, but this mistake had plainly arisen from want of good knowledge of systematic botany, which he was afraid had been rather neglected of late years, in comparision with morphology and biology. The real point of distinction between the two orders was that in the Rubiaceæ the ovary was inferior, while in the Loganiaceæ it was superior. M. Lapeyrère, in his communication published in the *Bulletin de la Société d' Acclimatation*, had figured the ovary of his *Mussænda borbonica* as superior, which showed that he did not understand that the genus *Mussænda*, as belonging to the Rubiaceæ, should have an inferior ovary. The *Gærtnera vaginata* bore a strong resemblance in texture and shape of the leaves and in colour and arrangement of the flowers to *Mussænda*; but in the latter genus the seeds are minute, whilst in the plant figured by M. Lapeyrère they were large and only one in each cell of the ovary. The opposite character of the leaves and the presence of interpetiolar stipules in both natural orders might also have further misled him. The mistake made by M. Lapeyrère was one therefore that might easily arise in the absence of good books of reference or of an imperfect practical knowledge of botany.

Mr. GREENISH asked if these berries had been treated in a similar way to coffee, roasted and ground, and, if so, did they yield a substance which would be at all suitable as a substitute for coffee.

Mr. CHRISTY said there were plenty of very excellent substitutes for coffee, but as the law now stood they could not be used as coffee. Any drink made from a new seed must be called by a new name, and that was what the public would not accept. If this were introduced, although it might have the taste and smell of coffee, if it were declared by the Pharmaceutical Society not to be coffee, it could not be sold as such.

Mr. LOMAS thought it rather strange that this French chemist should state that the berries contained caffeine if they absolutely contained none.

Professor DUNSTAN said they were stated to contain caffeine, and were put forward on that ground. Mr. St. John, the British Consul, tried them, and said they were much less fragrant than coffee. They seemed to present

no advantage over ground date stones and other coffee substitutes.

The PRESIDENT remarked that probably all berries when roasted were more or less aromatic. He must say he sympathized with the public on this question; he believed in coffee, and did not believe in any of the things which were substituted for it. He also believed in the physiological action of coffee, and could tell what it was without analysis. There was no doubt it was advantageous that the public taste should gravitate towards good things, and in the case of coffee, until a few years ago English people, as a rule, knew nothing about it. That which was sold as coffee was a mixture which was not coffee, but he would not say what it was. Those who had once enjoyed the luxury of real coffee, properly made, would naturally rebel against having anything substituted for it. He concluded by proposing a vote of thanks to Professor Dunstan, which was carried unanimously.

The next paper, of which an abstract was read by Mr. Holmes, was on—

STERCULIA GUM: ITS SIMILARITIES AND DISSIMILARITIES TO TRAGACANTH.

BY J. H. MAIDEN, F.L.S.

The paper is printed at p. 381, and gave rise to the following discussion:—

Mr. GREENISH asked if Mr. Holmes had examined this gum as one would gum tragacanth for the starch grains contained in it? He remarked on its having been boiled, and no starch being observed; but it was easy to take thin slices of gum tragacanth and detect starch grains, some partially empty and some in a sound condition. Tragacanth gum was understood to have its origin in a conversion of the starch of the plant.

Mr. CHRISTY said, with reference to a remark by Mr. Holmes, that if it were possible to turn these non-adhesive gums into adhesive ones it would be very important, that he had only that week had placed in his hands a substance and was asked what it was. He replied that it was fine shellac, and was then asked to put a small piece in his mouth, which he did, when it melted at once. He was then shown some Indian gums which had been transformed into this curious substance. He was assured the price was very little above that of Indian gum. How the transformation was effected he did not yet know, but hoped soon to discover.

Professor DUNSTAN said one point of great interest about these gums was the strong smell of acetic acid. It was not the smell of vinegar or weak acetic acid, but of strong acid, so that one would almost imagine that glacial acetic acid had been added to the contents of the bottle. He supposed that was not the case, but it was worth investigating.

Mr. MOSS asked if it was stated in the paper how the gum appeared. Was it necessary to make incisions in the stem, or did it exude naturally?

Mr. GERRARD agreed with Professor Dunstan that the presence of acetic acid was very interesting. Did the author say anything about testing for saccharine bodies. The question put by Mr. Greenish as to the presence of starch might explain the matter, the starch being converted into sugar, and by the action of a ferment into acetic acid; but it would seem as if the exposure of acetic acid would volatilize it, and its continued presence, therefore, would seem to show that it had some other source.

Mr. HOLMES said most gums were obtained partly from incisions and partly from exudations, the presence of the latter leading to incisions being made in order to get more gum. He thought Mr. Maiden said he had tested for starch and found none, but he should be pleased to let Mr. Greenish have a specimen for examination. He thought there was no possibility of acetic acid having been used in the preparation, and imagined it was a natural product. He could not say whether the gum had the same smell when it first exuded from the tree but he would make inquiries. The gum had no taste of sugar now, but he should be glad to give a specimen to anyone who would like to test it.

The PRESIDENT, in proposing a vote of thanks to Mr. Maiden, said it was very pleasant to have such a paper from a fellow countryman in Sydney who took an interest in pharmacology. The Society was only too happy to give the publicity it deserved to sterling work and he hoped they might have further communications of a similar kind.

Mr. HOLMES then called attention to a specimen of a plant sent over from Bechuanaland, which had been presented by Messrs. Hearon, Squire, and Francis. It was said to be used by the natives, and was called guap. In the growing state the natives chewed it to allay thirst, and it was also said to be a remedy for piles, but as to these alleged properties botanic authorities at the Cape could say nothing. It was said to be shipped in small quantity to America for use in some patent medicine. It was evidently sent over here on speculation. The plants of the genus to which it belonged bore a strong resemblance to the cactus group in having a fleshy stem, which was often angular and prickly, and in bearing flowers, which sprang from the stems at irregular intervals. He took the specimen to Kew for comparison and identification, and Mr. N. E. Brown, who had recently been working at this group of plants, found that it did not correspond with any known species, and had kindly consented to be present that evening to give information concerning it.

Mr. N. E. BROWN said he could not say much about this plant, but there were some things very singular about it. He easily recognized it as belonging to the peculiar section named Trichocaulon, of the genus Stapelia, which he had been investigating for some years, but he also found that it belonged to neither of the two species previously known. The plant was a dwarf-growing succulent, 8 inches to a foot high, with thick, fleshy, cylindrical stems, covered with spines on the angles. The two species previously known were principally natives of the west coast, and some ten years ago, Sir Henry Barclay, when Governor of the Cape, paid a good deal of attention to them, and sent a few of them to Kew. But they were very rare, because the Hottentots and Bushmen ate them whenever they were found, stripping off the skin and eating the central part raw. He had never been able to get a plant so as to taste it himself in the fresh state, but he had tried other members of the genus. When raw the plant was slimy and had a peculiar bitter flavour, which to him was not agreeable. When steeped in brandy the plant imparted a bitter flavour to it, and he thought made it more beneficial as an occasional restorative. In the western parts this plant was now becoming rare, and he found that Thunberg, when he wrote about it a hundred years ago, said the Hottentots and bushmen ate it. The name guap was apparently applied to more than one species. There were some other species belonging to the same group, but not the same genus, which he was told by Sir W. Barclay were also eaten by the Hottentots, and were called "quaqua"; whether there was any connection of name in different dialects he could not say. The Kaffirs did not eat them, but Mrs. Barber, of Kimberley, wrote to say that the stapelias were dying out, because they were not only eaten by the Hottentots, but also by sheep and goats, which were much reared in the midland districts. It was evident that wherever this plant came from there must be a considerable quantity, or it could not be ex-

ported as it was stated to be. He remembered Sir H. Barclay saying he had one species from Griqualand, but he believed it died before it reached England. He should make a description of this plant as well as he could from the specimen sent and probably publish it in the Journal.

The PRESIDENT in proposing a vote of thanks to Mr. Brown said it was very gratifying to find that the officials at Kew were so ready to reciprocate kind offices in these matters.

Mr. HOLMES then drew attention to some other donations to the Museum; the first being specimens of plants mounted, sent by Dr. J. T. Easmin, native of the west coast of Africa, who had taken his degree in England, and being interested in botany, had collected and sent over specimens of plants used in medicine by the natives. One which he had taken great trouble to investigate was a species of *Strophanthus*, having very long and twisted petals; also the *S. hispidus*, in which the petals were much shorter. He believed the one with the long petals was that one which yielded the smooth strophanthus seeds of commerce. Some of the same sort had been sent to Kew, but they had not yet received a name. Another plant, a species of *Paulo-Wilhelmia*, was used for poisoning fish; it was new to science, and had not yet been described, but he had been told that it would shortly be described and figured in the *Botanical Magazine*. Another plant belonged to the genus *Tephrosa*, which yielded a number of plants that were used for the same purpose in different countries. Another apparently belonged to the Leguminosæ, but had not yet been identified; it was said to be used by slaves in a decoction for committing suicide. Another was used for the relief of asthma, and this belonged to the same natural order (Asclepiadaceæ) as the *Tylophora asthmatica*, which was used in India for a similar purpose. There was also a collection sent by Messrs. Hearon, Squire and Francis, of various West African roots, of which the names and uses are as follows:—Rhimor, an infusion of which is supposed to have the power of clearing turbid urine, and of remedying morbid states of the alimentary canal. This is African heart root, *Sarcocephalus esculentus*. Ayra, an infusion of which is used for eruptions, and to purify the blood. Gbeyrihigbe, considered a great antidysenteric; is said to cure rheumatism when the root bark is scraped and ground with guinea grains, and applied to the painful parts. Zaelam, the leaf and root of which are used as purgatives. Dedee, a root used as a drastic purgative in bilious fevers, etc. Tarayharay, said to cure dysentery, the whole root being boiled. Agbana, the root-bark of which is employed in bilious fever, and is applied locally to reduce tumours and swellings. This is the finger root of Sierra Leone, probably a species of *Xylopia*. Cotopar, a root said to cure gonorrhœa, and is supposed to prevent syphilis. This is the African *Pareira Brava*, imported into London a few years ago. Ahay; the bark of this root is boiled with fresh lime and administered in acute hæmorrhagic dysentery; also in sunstroke, piles, and in kidney complaints. Gbaclalar; this bark is an anthelmintic and is said to have great effect on ascaris lumbricoides. An unnamed pod of seed, used for the same purpose as *Strophanthus hispidus*, was from *Kickxia africana*. There were also specimens of the bark of *Rhamnus Purshiana*, sent by Mr. Hartford, of New York, accompanied by specimens of what he considered to be the plant yielding it, but which was in fact another closely allied species, described under the name of *Rhamnus Californica*, or *R. oleæfolia*, from its resemblance of its leaf to that of the olive. Mr. Hartford wrote, "I had a talk to-day with Mr. Howard, the Secretary of the Southern Oregon Co., and he told me that on their property in Coos Co., Oregon, there was very little bark left now. It appears they cut down the trees or strip them where they stand and leave them to rot. In a few years this method will tell a tale. Very little cascara bark was got in California this year, nearly all came from Southern Oregon. Some fair quality came from Washington territory." This would indicate that the bark of more than one species was collected as cascara sagrada. *R. Californica* grew in the same regions of the United States and formed a large shrub or small tree of about the same height. It was stated in the *Pharmaceutical Journal*, ([3], xvii., p. 823) that the bark was of a brown colour externally and a bright yellow internally, and of an intensely bitter taste, which was persistent, but having no marked odour. The peculiar, strong and somewhat rancid odour possessed by cascara sagrada was well known, and this ought to form a distinguishing feature. The President of the Philadelphia College of Pharmacy, Mr. C. Bullock, had sent over a log of the *Pinus australis*, showing incisions and boxes made in the trunk to collect the turpentine, and also one of the tree yielding Canada balsam, showing the vesicles in the bark containing the balsam. The Curator then read the following extract from Mr. Bullock's letter:—"I have now the pleasure of sending specimens of 1st, the balsam fir of Canada, showing the vesicles containing the balsam. The specimens are from the province of Quebec, Canada. 2nd, a log of pine from the turpentine-collecting district of North Carolina, showing the chipping for exudation, and the 'boxing' for collecting and retaining it. The specimen has been utilized two years for collection of turpentine. I have had the upper end of the log cut in three directions and polished, to show the grain of the wood. The wood is a valuable one to builders, and is used largely for flooring. For this use it is cut into boards of from 4 to 6 inches in width. The lower end of the log is left as cut off in the woods to show about the height of the 'boxing' from the ground. The tree is the common long-leaf turpentine (*Pinus australis*, of Michaux), but generally known here as *Pinus palustris*. 3rd, Specimens of the fruit and leaves of the *Sophora speciosa*, from Texas, collected near San Antonio. The fruit is said to contain an alkaloid having narcotic properties. The examination of the fruit has not, so far, been very satisfactory, and deserves more attention." There were also specimens of the lignum aloes (the aloes of Scripture). In the East, several different woods (classed as lignum aloes) were used for funeral pyres. These specimens had been sent by Mr. Prebble, of Bombay; also microscopical slides to illustrate them, which he hoped to deal with on another occasion. The same liberal contributor to the Museum had also sent a further donation of Indian medicinal plants and other objects of interest. Specimens of uranium ore, both the best and second qualities from the mine lately discovered in Cornwall, had been sent by Messrs. A. and C. Bennett; also other minerals, including titanium, tin, zinc, arsenical and other ores. Mr. Kay, of Stockport, had sent an interesting specimen of salt pseudomorph, which had been found in cutting the Manchester Ship Canal. The last specimen to which he would call attention was one of genuine cubebs, and of oil distilled from it. The plant was cultivated in Java, and was sent by Professor Von Eeder, of Haarlem. Of late years true cubebs had been scarce in commerce, and of inferior quality.

The PRESIDENT said the Society's Museum was a very valuable one, in some respects without a rival, and the desire of the Council was that it should maintain its reputation as being a typical museum of all products having any relation to pharmacy or medicine. He proposed a vote of thanks to the donors of these numerous specimens, which was agreed to unanimously.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council was held on Wednesday, the 6th inst., at No. 11, Harcourt Street, Dublin, the President, Mr. Charles Evans, in the chair.

The other members of the Council present were Messrs. Doran, Beggs, McCormack, W. F. Wells, Junr., Whitla, J. Montgomery, McNaught, Baxter and Professor Tichborne.

A letter was received from Mr. Richard W. Pring, of Belfast, expressing his regret that he could not withdraw his resignation as a member of the Council.

The President: I am sure we all regret that Mr. Pring could not see his way to reconsider his determination.

On the motion of Mr. Beggs, seconded by Mr. Wells, the standing orders were suspended in order that the election of members might now be taken.

On the motion of Mr. Wells, seconded by Professor Tichborne, Dr. Rodolph A. C. Burnes, of 83, Queen's Street, Dublin, was elected a member of the Society; and

On the motion of Mr. Wells, seconded by Mr. Hayes, Mr. Hugh Montgomery, of the Meath Medical Hall, Kells, was elected a member of the Society.

Mr. Wells moved that Dr. Burnes be elected a member of the Council in the room of Mr. Pring. Dr. Burnes kept an open pharmacy and intended to carry on the business, so that he was practically one of themselves. He had lately taken very high degrees in medicine in Trinity College, and would be a very useful member of the Council.

Mr. Beggs seconded the motion, which was carried unanimously.

Election of Officers.

The next business on the paper was the election of officers of the Society.

Mr. Wells: I have great pleasure in again proposing that Mr. Charles Evans be elected President for the ensuing year. We have had but a short experience of him, but I am sure I express the opinion of every member of the Council when I say that we are well satisfied with the way in which he has done his work.

Mr. Whitla: It gives me great pleasure indeed to second the motion. It is not necessary for me to add anything save that it is the opinion of the licentiates of our Society that we have been most fortunate in our choice of a President; and I am sure the prospects of the Society will not in any way suffer by his re-election.

Professor Tichborne: I beg to put the motion that Mr. Charles Evans be re-elected our President. I need not add anything in expression of the general feeling of pleasure that we have in re-electing him.

The motion passed by acclamation.

The President: Allow me to thank you for this expression of your confidence. I feel how inadequate I am to fill the responsible position to which you have called me; but I rely on your assistance in everything that may come before us.

Professor Tichborne: Allow me the privilege of proposing our Vice-President. We all feel that Mr. Wells has been a most efficient member of our Society, none more so. He has shown an energy which can only come from a real interest in the work of the Society. He also seems to be in accord with the general feeling of the Society, which I think is a very important point. I have no doubt always expressed the opinion that the office of Vice-President should be filled by one of our country members, and in future I should like to see the North and South alternately represented, but at present the old members of the Council residing in the North have declined this honour. As to the President, I believe he should be always resident in Dublin; but as regards the office of Vice-President we have fallen on good times, for we have a most excellent man for the office in Mr. Wells, and I have great pleasure in proposing him.

Mr. Beggs: It is to me a very pleasing duty to second the proposition of Professor Tichborne. Mr. Wells has taken a deep interest in pharmacy almost from the institution of the Society, and we all know that he is in perfect accord with the members of the pharmaceutical profession generally. His conduct for years has been most consistent, and I am sure his judgment will be most useful on the intricate questions that may arise during his year of office.

The motion was carried by acclamation.

The President: I do not think you could have made a better choice than Mr. Wells, and I am personally obliged to you for appointing one who is likely to be of so much assistance to me. I have great pleasure in endorsing everything that Professor Tichborne and Mr. Beggs have said of Mr. Wells.

The Vice-President: I feel deeply the honour which you have conferred upon me. I look upon it as a very high honour to be elected Vice-President of this Society. Having regard to the duties that belong to the office, were I to consult my own wishes I would not accept it; but when you have unanimously elected me it would be a poor return on my part to shrink from the difficulties that may have to be encountered. It is the more pleasing when I find that my action has been approved of by almost the whole of the pharmaceutical chemists of Ireland, and knowing therefore that I have done what has pleased them I have no difficulty in taking office, feeling assured that I shall have the support of the members of the Council in whatever may come before us. My task will be almost an easy one when we have such a President as Mr. Evans, and I am sure that from the attention that he will give to his office, I shall be seldom called on to take the chair. I sincerely thank you for the honour you have done me; and I trust that at the end of my year of office you will not have reason to regret having placed confidence in me.

Professor Tichborne: I have great pleasure in proposing that Mr. Hodgson be elected Treasurer for the ensuing year.

Mr. Doran: I have great pleasure in seconding the motion. We could not have a better man.

The President: It is a great pleasure to me that Mr. Hodgson is still with us. He did send in his resignation, but at a time of great difficulty he consented to stay with us, and I hope that for many years to come we shall have the advantage of his advice.

The motion passed by acclamation.

On the motion of Mr. Beggs, seconded by Mr. Baxter, the outgoing auditors, Messrs. Simpson and Hayes, were re-elected.

The Vice-President moved that the following gentlement constitute the Law Committee for the ensuing year:—Messrs. Beggs, Grindley, McCormack, Merrin, Professor Tichborne, McNaught and J. Montgomery.

Mr. Whitla seconded the motion, which was unanimously agreed to.

Mr. Whitla moved that Messrs. Beggs, Hayes, McCormack, Simpson and McNaught be the Committee for the examination of certificates for the ensuing year.

Seconded by Mr. Baxter and agreed to.

Mr. Baxter moved that Dr. H. C. Tweedy, F.R.C.S., be reappointed examiner for the Preliminary Examination; Mr. Harry Carter Draper, F.C.S., Examiner in Pharmaceutical and General Chemistry; and Dr. William Whitla, in Materia Medica and Botany. It was most important that the Society should have such examiners as would maintain its educational status and keep its students abreast of the times; and the

work already done by the gentlemen named had been thoroughly approved of.

Mr. Whitla seconded the motion, which passed unanimously.

The Vice-President mentioned that the term of office of Dr. Evans as one of the Examiners would not expire until next January; therefore it was not necessary to re-elect him now.

A letter was read from Mr. Patrick Kelly asking that the hundred hours of laboratory work (for chemistry) at present required to be certified in the case of a candidate for the license should be reduced to fifty or sixty.

The writer stated that such a lengthened course was not required by any other licensing body in the United Kingdom. There was only one school in Dublin at which students could get it: but attendance at it was required during the daytime, and therefore students who had to be at business during the day could not avail themselves of it. If the amalgamated schools should give night lectures it would be at the cost of from eight to ten guineas for the hundred hours, and would involve the necessity for candidates from the country stopping in Dublin for six months instead of three, which meant an excessive expense to them.

The President: I would like to hear an expression of opinion from members on this matter.

Mr. McCormack said he did not know how the rule requiring the hundred hours could possibly be changed. It had been already discussed, and had received the sanction of the Privy Council, and he did not see how they could go over the same ground again.

Mr. Beggs: The one hundred hours' rule was only passed a short time ago, and I do not think it has been sufficiently tried yet.

Mr. Baxter: I have considerable sympathy with Mr. Kelly. I think one hundred hours an extreme amount of laboratory work to require. But we must take into account that the examination papers are much more difficult now than they used to be.

Professor Tichborne said the rule pressed hardly on the country candidates, on whom it imposed great expense and trouble. It did not so much affect those who were resident in Dublin. Of course it meant higher fees to the traders.

The Vice-President said he thought it would be premature to change this rule so soon. It only came into force last July, and if they attempted to do away with it now the Privy Council would think that they did not know their own minds. The subject was very well threshed out at the discussions which took place at the Council, and the opinion of the members then seemed to be that candidates were not well enough prepared in chemistry. Things were rather upset at present. The night schools had been given up; but if an enterprising professor were to start a night school he thought he would get plenty of students. Of course more would have to be paid, but it would be a pity for the sake of a few pounds not to have the candidates well prepared. He thought it would be better to let this matter rest for a little.

Mr. Doran said that if a man showed himself capable of passing at an examination, even though he had only had fifty or twenty-five hours study, he did not see why he should not be allowed to pass.

The Vice-President: If you did that it would amount to going back to the old times when we had no curriculum at all.

Mr. Doran: I do not see why a man should not be allowed to pass either the Preliminary or the final examination if he shows that he is fit to do so. A man might learn chemistry by private study without attending any school.

Mr. McNaught remarked that there were a considerable number of small towns in Ireland with populations of not more than from 4000 to 5000, in which there were good science classes.

The President: Mr. McCormack has a motion on the paper that the Society should establish a night school of chemistry. Would you appoint a special committee to look into both matters? We know that our candidates are not now in a position to obtain the hundred hours study, no matter how desirous they may be to get it. It is a great hardship on candidates to be obliged to pay double fees.

Mr. McCormack was permitted to move his resolution, which appeared farther down in the *agenda* paper, and which was "That a night school of chemistry be established in connection with the Pharmaceutical Society." About a fortnight ago he heard that the Ledwich and the Carmichael School were about to discontinue their night lectures. If the Society's candidates had no places where they could take out their lectures they would drop off. If the Council could not see their way to establishing a school of chemistry he was afraid they would have to give up the rule requiring the hundred hours work. It might be referred to a committee to inquire as to the cost of establishing a school.

The Vice-President said he would second the proposal for a reference of the subject to a committee.

Professor Tichborne: The Committee should meet early and report to the next meeting of the Council, so as, if possible, to have the matter arranged before the winter session begins.

On the motion of Mr. McCormack, seconded by Mr. Whitla, it was resolved that Mr. Kelly's letter and Mr. McCormack's notice of motion be referred to the following Committee:—Dr. Tichborne, and Messrs. Grindley, Beggs, Hayes, Hodgson, Merrin and Simpson.

The following letter, dated September 9, from Mr. Greenwood Pim, Secretary to the College of Physicians and College of Surgeons conjoint examinations, was read:—"Dear Sir,—Replying to your favour of the 6th instant, I was under the impression that the service alluded to in your first letter was the three months with a licentiate apothecary, etc., formerly accepted. That mentioned in page 7 of the New Regulations is, as you will observe, service for three years as apprentice, or one year as paid assistant, which is very different from the three months instruction formerly. This accounts for my not mentioning the matter in mine of August 12.—Yours, etc., Greenwood Pim."

The Vice-President: By this letter we find that a year's service as paid assistant to a pharmaceutical chemist will be taken.

The President: Or three years' apprenticeship.

A letter was received from Mr. Robert Wall enclosing a certificate of practical pharmacy in lieu of indentures, which he desired should be returned to him.

The Registrar was directed to write to Mr. Wall stating that the certificate he had sent was not sufficiently specific.

The President said the next item on the *agenda* paper was a letter from "an anonymous correspondent, stating himself to be a licentiate, complaining of breaches of the Poisons and Pharmacy Act." He (the President) had had this anonymous letter mentioned in the paper in order to take the opinion of the Council as to whether it should be read or not.

Professor Tichborne: I move that it be marked "not read," so as to let it go to the world that we do not consider anonymous letters.

The letter was marked accordingly.

A letter from Mr. James I. Watterson, of Belfast, stating that owing to the recent changes in the Society he did not feel inclined to go in again for the examination, as no protection was afforded to chemists; and asking that half the fee which he had paid should be refunded.

Mr. Beggs: There is no precedent for the return of fee. We will give him a second examination free.

The Registrar was directed to inform Mr. Watterson that no exception could be made in his case to the regulations.

A letter was read from Dr. Montgomery stating that it was not his intention to renew his subscription to the Society.

The President: We all regret Dr. Montgomery's withdrawal from the Society.

A letter was read from Mr. A. J. Paterson resigning membership of the Society.

A prospectus from Mr. F. J. Hanbury, of an illustrated monograph of the British Hieracra, was submitted to the Council.

Donations were announced from the Smithsonian Institution of Part I. of their Annual Report for 1886; from the Alumni Association, Philadelphia College of Pharmacy, of their 25th Annual Report; and from the Mason Science College of their Calendar for 1889–90.

On the motion of Mr. McCormack, seconded by Mr. Beggs, thanks were voted to the donors.

A report from the Certificates Committee was adopted.

A report from the Law Committee was postponed until the next meeting of the Council.

The report of the Examiners upon the October Preliminary and Licence examinations was laid on the table.

The President: You will see that 50 per cent. of the candidates at the Preliminary examination failed.

The Vice-President moved that the following licentiates be admitted members of the Society:—Messrs. William Hanna, Main Street, Bangor; Charles Marshall, Hamilton Street, Belfast; and John Anderson, 47, Market Square, Lisburn.

The President seconded the motion.

Mr. Whitla moved that Mr. Edward P. Murray, licentiate of Clones, be re-elected a member of the Society. Mr. Murray was a member, but ceased to subscribe because he did not approve of the action of the Council some time ago. He desired to rejoin because he had every confidence in the present Council.

The Vice-President seconded the motion.

On the motion of Mr. Baxter seconded by Mr. Doran, Mr. W. J. H. Madden, licentiate, of Melrose Terrace, Belfast, was proposed as a member of the Society.

On the motion of Mr. McCormack, seconded by Mr. Wells, Mr. T. W. Robinson, of 112, Upper Georges Street, Kingstown, was proposed as a member of the Society.

The Council then adjourned.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The seventh general meeting of the fortieth session was held at the Royal Institution on Thursday evening, Nov. 7, the President, Mr. A. H. Samuel, F.C.S., in the chair.

The minutes of the previous meeting were read and confirmed and the following donations announced: The *Pharmaceutical Journal*, from the Society; the *Canadian Pharmaceutical Journal*, from the publisher, and the *Pharmaceutical Record of New York*, from the publisher.

A vote of thanks having been accorded to the respective donors,

Mr. J. S. Ward said he believed a law had recently been passed prohibiting the sale of methylated spirit between a certain hour on Saturday night and Monday morning; he was not, however, certain of the exact hours proscribed, and he should be glad to have further information on the point.

Dr. Symes said that some time ago one of the excise officers intimated to him the proposed prohibition of the sale of methylated spirit beween 10 p.m. on Saturday and 8 a.m. on Monday. He had not, however, had any notice from the excise that this had passed into law, and he was under the impression that it had not yet come into force.

Mr. J. Bain said it had already come into operation and that he had received a notice of it from the supervisor of the Inland Revenue.

Mr. T. F. Abraham said his firm had not received any information of the change in the law, and he considered it strange that all holders of the licence had not received a notice, seeing that some had.

The President now called upon Mr. M. Conroy, F.C.S., to read his paper on "Castor Oil Adulteration," which will be found printed on page 385.

In the discussion that followed, the President, Messrs. Bain, Parkinson, Symes and Ward took part, and a vote of thanks, proposed by Mr. R. Parkinson and seconded by Dr. Symes, was very heartily accorded to Mr. Conroy for his paper.

The President now called upon Dr. Symes to read his paper on—

Essence of Senna Pods.

BY CHARLES SYMES, PH.D.

Nowadays when, like the Athenians of old, we are constantly looking for something new, it is rather gratifying to recognize the reintroduction of a drug which can claim antiquity as one of its virtues.

Not only were senna pods known but their properties were recognized a century or two ago; but so far as I can gather they have not been popular at any period until quite recently.

Dr. Keith, after giving them an extended trial, recommended them to Dr. Macfarlane, who on gaining experience of their utility as an aperient contributed a note on the subject, which was published in the *Lancet* of July 27 last. Soon after this a parcel which had lain on our shelves undisturbed for nearly twelve months was brought into use on a few ounces of a concentrated infusion being applied for.

This small quantity was prepared by the evaporation of an infusion in the way mentioned subsequently by Mr. E. H. Salmon, in the *Pharmaceutical Journal* of October 12, p. 281. This produced a dark liquid, possessing scarcely any odour or taste, and in no way reminding one of its relation to senna leaves.

I should perhaps have agreed with Mr. Salmon that it was tasteless; but recently a customer mentioned that after taking "tasteless castor oil," "tasteless cod liver oil," and "tasteless cascara sagrada" he had come to the conclusion that a chemist's notion of the meaning of "tasteless" was a rather extraordinary one and differed widely from that of the public generally.

This was fairly efficient as an aperient, but as it scarcely came up to expectations a larger quantity was prepared to meet a growing demand, in what I regard as a more rational manner.

Mr. Groves long since determined that the activity of senna leaves depended on the presence of a compound of cathartic acid with calcium and magnesium, and that this was injured by continued heating.

The active agent being cathartin in senna pods also, it was evident that to obtain the best results extraction by pressure, as advocated by Mr. E. W. Bell in the *Chemist and Druggist*, October 26, p. 609, must be adopted. Mr. Bell's proposal is in fact all that could be desired, but experience on several batches convinced me that he does not completely exhaust the leaves, and that the resultant fluid extract is not a true valoid. In other words, the 16 ounces of finished essence does not in my experience represent the full activity of the pound of pods from which it is prepared. No doubt the evaporation method tends to

produce the more nearly tasteless preparation, but this will depend to some extent on whether the pods are old and brown or new and green.

Nearly all the supply at present is fairly old, for the demand until recently has been exceedingly small, but that it has grown considerably will be evident from the fact that the stock offering on the London market on October 10 was from fifteen to twenty bales, whereas a fortnight later, as far as could be ascertained, this had all been bought up, and there was not a bale remaining in first hands.

If the pods have been well preserved they contain a small quantity of oleo-resin and a little wax, which are readily extracted by ether (as sample now shown). Dr. James wrote in 1752: "The fruit or follicles of the senna tree are less active than the leaves," and this is supported by some opinions at the present day; but Mr. Salmon found those he examined to contain 2½ per cent. of cathartin as compared with 2 per cent. only in the leaves, but he does not say if this substance was purified further than by precipitation with alcohol; if not it may contain some little mucilaginous and albuminous matter.

Two samples of pods examined by myself contained 0·72 and 0·80 per cent. of purified cathartic acid respectively, obtained by precipitating a fluid extract with an equal bulk of absolute alcohol; the liquid filtered from the precipitated mucilage and salts was mixed with more alcohol as long as a precipitate was produced. This precipitate was washed with alcohol, dissolved in a little water freed from albumen by a few drops of hydrochloric acid, and the filtrate completely precipitated by the addition of more hydrochloric acid. The impure cathartic acid thus obtained was purified by dissolving in 60 per cent. alcohol, and precipitating by ether. My object, however, has not been to make an exhaustive inquiry into the relative merits of senna leaves and pods, but to propound on a knowledge of what appears to me the best lines a rational formula for the fluid extract or essence. Although hydraulic pressure is undoubtedly the best for the purpose, a good screw press answers fairly well, and the "Enterprise Press" still better for this particular drug. Operating then on 1 pound of pods the form I should suggest is as follows:—

Senna pods, slightly bruised.	
Rectified spirit	5 ounces.
Distilled water	12 ounces.

Press the pods well down in the containing vessel, and pour on them the mixed spirit and water; in twelve hours reverse the position of the pods, and allow to stand a further period of twelve hours. Subject to strong pressure, set aside the liquid in a bottle, break up the marc, and pour thereon the following, previously mixed:—

Glycerine	1 ounce.
Liquid ammonia	20 minims.
Distilled water	19 ounces.

Allow to stand four hours, press strongly, strain and evaporate the liquid so obtained until, when well mixed with the first liquid and filtered, 16 fluid ounces will be produced. The addition of one drop of each of oil of carraway and ess. oil of almonds, with two drops of essence of lemons, makes it really palatable.

The medium adult dose is 1 fluid drachm.

At the close a discussion ensued in which Messrs. M. Conroy, T. F. Abraham, H. Wyatt and J. S. Ward took part, and a vote of thanks, proposed by Mr. M. Conroy and seconded by Mr. T. F. Abraham, was heartily accorded to Dr. Symes for his paper.

The President now called upon Mr. F. A. Brown to exhibit his "Extemporized Pinhole Camera."

This was made out of an empty Le Page's liquid glue box—a hole was bored in each end of the box and covered with a piece of tin, and in the exact centre of each piece of tin a very minute hole was pierced. The box was now divided at the middle, thus making a double camera. In order to fix the plates at proper focal distances Mr. Brown fastened some pieces of ribbed paper to the sides of the box. The object in devising the apparatus was to show that photographic negatives can be taken with a camera without a lense, and as evidence of the success of the experiment Mr. Brown showed several negatives he had taken and explained that the smaller the hole through the tin the better the result.

The President in proposing a vote of thanks to Mr. Brown said it had been a very interesting communication, and they were deeply indebted to him, for he had also on several occasions sent papers to be read before the Association, and he took this opportunity of thanking him in person. This was seconded by Dr. Symes and carried with applause.

The President now moved that owing to the lateness of the hour the "Discussion on The Pharmacy Act in its Relation to Unregistered Assistants" be adjourned.

This was seconded by Mr. M. Conroy and unanimously resolved.

The meeting now terminated.

UNQUALIFIED ASSISTANTS AND THE SALE OF POISONS.

Meeting in Sheffield.

On Wednesday evening a meeting of persons in Sheffield who are concerned in the sale of scheduled poisons, convened by the Sheffield Pharmaceutical and Chemical Society, was held in the Society's lecture hall. The object of the gathering was to discuss the question, "Who is the Seller of a Poison under the Pharmacy Act?" Apparently nearly all present were connected with the Society. The President of the convening body, Mr. A. R. Fox, was elected to preside, and among those present were Mr. Newsholme, Mr. Learoyd, Mr. Bradwall, Mr. Preston, Mr. Archer, Mr. Ellinor, Mr. R. Watts, and a few other of the leading chemists in the town.

The Chairman explained the circumstances out of which the question arose, and read a telegram announcing that in the action brought by the Pharmaceutical Society of Great Britain at the instance of a coroner, against an unqualified assistant for selling a poison, a decision had been given that the word "sell" in the 15th section of the Pharmacy Act refers to the actual seller.

A letter was then read by the Secretary to the Society (Mr. Morrison) from Mr. J. M. Furness (an ex-president of the Society), in which he wrote:—"The subject you are to discuss is very important, and although the assembly you will have can scarcely approach it without bias, yet it is to be hoped that the opposition to such illogical innovations as are proposed may be none the less effective on this account. The personal qualification and active supervision of the proprietor of each establishment dealing in dangerous and poisonous drugs is the very best protection the public can have."

Mr. A. H. Allen, the borough analyst, in the course of a letter said:—"I hold that the intention of the law is that every sale of deadly poison should be properly recorded, so that in the event of necessity the purchaser can be discovered. I think the Act should be very strictly complied with as regards requiring the name and address of the purchaser, the alleged purpose for which the poison is wanted, and the introduction of a stranger should be rigidly insisted on, unless he practically introduce himself by means of his card. On the other hand, I cannot see that it matters by whose hands the poison is handed over the counter. If the view be insisted on that the sale of poison can only be made by a regis-

tered pharmacist, the result will be that in many country places the sales of poison will not be recorded at all, or in order to evade the Act something else will be sold and the poison be given away. It should be made to the interest of pharmacists to comply with the law instead of setting them to think how they can evade it."

Mr. Learoyd opened the debate by moving the following resolution:—"That this meeting cordially approves of the recent interpretation of the 15th clause of the Pharmacy Act, 1868, and is prepared to support the Pharmaceutical Council in prompt action in all cases of its infringement." He began by saying he had the greatest sympathy with all the members of the trade whether qualified or not; and he proceeded to speak of the time when there were no compulsory examinations, and when apprentices were apprentices and not students. But he pointed out that, years ago, they were led to expect compulsory examinations, so that the present state of affairs in the trade was not altogether a surprise. He next showed how the Pharmacy Act was passed in the interests of the public, and remarked that the Act had been a success in the direction at which it was aimed. He touched upon the establishment of stores, and the irritation they had caused among chemists, and then dealt with the real question at issue, viz., the interpretation of section 15 of the Pharmacy Act. He supported the interpretation of the Pharmaceutical Society, and said its general adoption would have a most beneficial effect upon pharmacists throughout Great Britain. That interpretation meant that the pharmacist of yesterday should stand in one position and the pharmacist of to-morrow in another position. This was about the first gathering in the provinces to discuss the question of whether the interpretation by the Pharmaceutical Society was proper or not? whether the Act meant that the person who actually handed over a poison to the buyer was responsible, whether he was an assistant, apprentice or substitute, or his qualified employer. He confessed he had a sympathy with the old assistants who were not qualified under the Act, and yet who discharged their duties faithfully and well, but on the other hand they had carefully to consider the object of the Act. He confessed that he did not think it was intended that the master or principal of an establishment should only be the person to hand over and sell a poison, yet he was convinced that the new interpretation would benefit the pharmacists and tend to enhance their position.

Mr. G. Ellinor formally seconded the motion.

Mr. Preston said he had no sympathy with those who being registered pharmacists broke the law wilfully or ignorantly, or with those who, not being registered, by subterfuges few or many, evaded the law; yet they were bound as reasonable men to look at the question from a broad and sympathetic point of view. The position in which they now stood was that the Council of the Society declared the reading of section 15 to have been wrong during the last twenty-one years. It seemed strange to him that they should go on so long before they found out that the words "any person" in that section meant any person who was not registered under the Pharmacy Act. The law of prescript was that if for a certain number of years there had been agreement upon a certain line that became the reading of the law Such being the case in regard to the 15th section, he thought they would be wrong in saying now that either the Pharmaceutical Society or anyone else was right in interpreting "any person" to be anyone who was not registered. He inferred that the phrase about "any person who shall keep open shop" in the Act referred not so much to any person in a registered man's shop as to any person who might sell poisons in the open air. It had no reference to registered people keeping open shop who employed servants, and were responsible for their conduct at their establishment. That this was the true reading he had only to point to section 17, which stated that the person on whose behalf any sales were made by any apprentice or servant should be deemed to be the seller. Therefore he held that the seller, whether he was apprentice or servant, registered or unregistered, was none other than the registered proprietor of the establishment. He expressed surprise at the result of the recent prosecution. He went on to refer to what is known as the widow's clause, and said under it a registered employé gave virtue to an unregistered widow, administrator, or trustee. He could come to no other conclusion than that the seller was the proprietor of the establishment, who was the responsible person. If he looked at the question from a selfish point of view he must naturally feel glad at this latest interpretation of section 15, but he desired to look upon it from a general standpoint. He was afraid if the decision were taken to a higher court it would be reversed.

Mr. J. H. Bradwall supported Mr. Preston's arguments. He pointed to the matter of label, and said the presumption was and had been all these years that it should contain the name and address of seller. Surely it was never intended by the framers of the Act that when a poison was sold it should bear the name and address of the man who actually handed it over the counter. The law evidently meant the proprietor of the establishment. Then as to the book of registry, the Act distinctly stated that it should be kept by the seller, who naturally was the keeper of the shop.

Mr. Hartley, who said he was an unqualified assistant, contended that the case which came before Justices Grove and Lopes showed the Act meant the proprietor of the shop, and not simply the person who handed the poison over the counter.

Mr. Archer agreed with the arguments of Messrs. Preston and Bradwall.

Mr. Humphrey doubted whether it was originally intended the Act should have the interpretation now given to it by the Society. The qualified assistants (and he was one) would benefit by it, but he should liked to have heard something said as to how the decision would affect the small pharmacists who could not afford to keep a qualified assistant.

Mr. R. Watts expressed approval of the proposed resolution.

Mr. Newsholme also supported it. He referred to the charter of incorporation which was obtained in 1843, and said at that time those who joined the Society were recommended to pass examinations. The whole intention of the Pharmacy Act was qualification, and it was not intended that the principal only should be qualified. He contended that the qualification of the seller of poisons was contemplated, and pointed out two Scotch cases as showing that the seller meant the person who actually sold the poison. Of course it should be understood that an unqualified assistant could hand over a poison if his qualified master was standing by and took the responsibility. He wished to make it clear that the Council of the Pharmaceutical Society did not interpret the Act; it left that to the judges and the magistrates, and simply desired to carry out the law. With regard to labels on poisons he argued that the name of the proprietor of the shop was put on for the purpose of tracing. Assistants, even if qualified, did not always remain at a shop. As to the widows' clause, it stipulated that there should be a qualified man to protect the public. The aim of the Act was that poisons should be sold by educated people, and an educated man might often prevent a case of suicide.

Mr. Preston inquired whether the Scotch decisions mentioned had not been reversed?

Mr. Newsholme replied that so far as he knew they had not been.

Mr. Marshall thought there was some doubt as to the 17th section, but still he agreed with the latest interpretation of the 15th.

Mr. Ellinor expressed the opinion that it was originally intended the hander over of a poison should be qualified, and the great mischief was they had not fully acted up to the Act in the past.

Mr. Eardley agreed with the resolution. He said the Act was passed not for the benefit of the chemists and druggists, but for the benefit of the general public. It, however, struck him as strange that for twenty-one years they had gone on without there being prosecutions of unregistered persons who actually sold poisons. But the stricter the law was made the better it would be for qualified chemists.

Mr. Learoyd then replied on the discussion. He said undoubtedly the Act had been framed in the interests of the public, and they had to ask themselves whether they ought not to carry out the meaning of the Act, and whether they would be carrying the responsibility placed upon them if they delegated to unqualified persons the responsibility of selling poisons.

Mr. Preston then formally moved the following amendment: "That whilst the meeting desires to express its sympathy with the Pharmaceutical Council in its present trying ordeal, it thinks the recent interpretation of section 15 is out of harmony with the plain language of section 17."

Mr. Bradwall seconded the amendment.

On a show of hands being twice taken the Chairman announced that the voting was equal, but he gave his casting vote in favour of the resolution, which was accordingly carried.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The seventh meeting of the session was held on Thursday evening, Nov. 7, in the Association's rooms, Commercial Street. There was a good attendance.

Owing to the unavoidable absence of the President the chair was taken by Mr. T. C. Henderson.

After the minutes of the last meeting had been read and confirmed, and some other business transacted, the Chairman called on Mr. W. G. Lamont to open the discussion on "Ought the Curriculum Bill to become Law?"

In his opening remarks Mr. Lamont said that ever since the passing of the Pharmacy Acts the Pharmaceutical Society had kept what might be termed a skeleton in the cupboard in the shape of a higher education Bill. In the year 1880 this skeleton was taken out, clothed in flesh, and placed before the profession in the shape of this much discussed "Curriculum Bill," and although there had been slight changes made in it since then, yet the framework was still the same. After reading the various clauses of the Bill Mr. Lamont discussed each of them, and in a very able manner advocated the merits of the Bill, and enumerated the various advantages which all connected with pharmacy would acquire should it become law. Speaking on the various points which the opposers of the Bill had from time to time brought forward he said that one of the most prominent was the expense to which students would be put by having to attend, for at least six months, a recognized course of lectures. He did not think that this would really be the case when the whole thing was fully considered. He had only to ask them to examine the various pass lists of the Pharmaceutical Society and see the numbers of failures that were therein recorded, and although nothing was said in these lists how often any man failed, yet it was a well known fact that even out of these passes many only got through after repeated attempts. What was the cause of these numerous failures? Simply imperfect training. Quoting the words of Mr. Gilmour in his inaugural address, who said that in his experience five cases out of every six candidates who were successful had attended some course of training, he asked, would it not be better, and perhaps cheaper, if there was a recognized path to tread? Moreover he was confident that if this Bill became law the passes, instead of being a miserable 40 per cent., would go up to 80 or 90 per cent., as in Germany, and that in after years the students themselves would appreciate the advantages of this curriculum. Education was a thing which they could not have too much of, and therefore they ought not to oppose this Bill, which would ensure the higher education of the members of the profession. On concluding Mr. Lamont was greeted with a hearty round of applause for the able manner in which he had advocated his side of the discussion.

Mr. Skinnner, who had the negative side, then laid his views before the members. His main points were that the present examination was quite a sufficient test for a man's ability to keep open shop as a chemist and druggist. That those who thirsted for the higher education had the privilege of going in for the Major, which ought to satisfy their ambition. The compulsory course of training, he said, would entail great hardship on country students. It was all very well for assistants situated in large centres to attend these lectures, but how was any person situated in the far off country districts to manage to do so. It meant struggling on for years at the present rate of pay before a sufficient sum could be saved to enable one to give up employment even for six months, and the result would be that only moneyed persons would be able to afford to allow their sons to become chemists. The passing of the Bill, moreover, would only mean a large increase of stores, doctors' shops, etc., and would never prove a protective measure in any way. What chemists wanted was a new Pharmacy Act—an Act whereby their interests would be protected from the many usurpers that now existed, and not until the passing of such a measure should the Pharmaceutical Society speak of imposing any curriculum. Mr. Skinner also spoke at some length on the rejection of the clause providing that branch shops should be managed by qualified assistants only; that clause, he said, ought to have been retained, and unless some decided action was taken on this point the Bill would prove the ruin of the trade.

On the conclusion of the debate some considerable discussion took place, in which the Chairman, Messrs. Lindsay, Lee, Petrie, Mair, and others joined, and a vote having been taken, it was found that the negative side had gained the day by the narrow majority of four.

The Chairman having intimated the next meeting the proceedings then closed.

Parliamentary and Law Proceedings.

Action under the Pharmacy Act.

On Tuesday last the action of the Pharmaceutical Society of Great Britain *v.* Wheeldon came before His Honour Judge Holroyd at the Wandsworth County Court. The action was brought to recover a penalty from the defendant for selling a poison, he not being a registered chemist and druggist.

The Pharmaceutical Society was represented by the solicitor, Mr. Flux; Mr. Rawlinson, barrister, appearing for the defendant.

Mr. Flux, in opening the case, said, This, your honour, is an action brought to recover a penalty under

the Pharmacy Act of 1868. I think the Pharmacy Register is in Court; it is sent by the Home Office to the various County Courts, and if you have the book in your hand I can refer you to the various passages. The Act commences with a recital that it is expedient that persons dealing in poisons should have a competent knowledge of their business, and then it proceeds in clause 1 with these words: "From and after the 31st day of December, 1868, it shall be unlawful for any person to sell"—the word "sell" is the one on which I have to rely to-day—"or keep open shop, unless such person shall be a pharmaceutical chemist or a chemist and druggist within the meaning of the Act, and be registered under this Act." Then there are clauses which define poisons, and I have to prove that this defendant has sold a poison within the meaning of the Act. Then at section 13 there is a provision as to the making and keeping of a register, and that the register shall be evidence that the persons therein specified are registered according to the provisions of the Pharmacy Act. So that the production of the register will carry me so far as to prove that this defendant's name is not upon it, and, therefore, that he is not a duly qualified person within the first section. Then section 15 creates the particular offence in respect of which this action is brought. "From and after the 31st day of December, 1868, any person who shall sell, or keep an open shop, for the retailing," and so forth, "not being a registered pharmaceutical chemist," etc., "shall for every such offence be liable to pay a penalty or sum of £5, and the same may be sued for, recovered, and dealt with in manner provided by the Pharmacy Act for the recovery of penalties under that Act." I rely upon the register.

His Honour: You say the name not being on the register shows that he is not a registered person under section 1.

Mr. Flux: I do. Then section 15 says that the penalty incurred may be sued for in manner defined by an earlier Act; and my case is that I am suing in accordance with that Act, as I can easily show, if the learned Counsel puts me to that. I will assume for the moment that I need not trouble the Court so far. This particular case has arisen consequent on a death which led to an inquest; and the learned Coroner for this Division of London having laid the facts before the Council of the Pharmaceutical Society, that Society has—

Mr. Rawlinson: I do not want what the Council has said.

Mr. Flux: That Council is charged by the Act of Parliament with the bringing of such actions. I am going no further than saying that that Council has in the exercise of its discretion duly authorised the bringing of this action. The facts shortly stated are these: The defendant on a Sunday evening was left apparently in sole charge of a shop at which poisons scheduled under this Act of Parliament were for sale. A female attended at the shop to make a purchase and saw the defendant. Then in accordance with the requirements of the statute the defendant and the purchaser signed or initialled a poison book which was kept at the shop as required by the Act. The purchaser obtained the article for which she had asked, of course paid for it, and in the course of that same night was found in a very sad state, and within some forty-eight hours she became a corpse. The poison book is I believe in court, and your honour will find upon the face of that book the signature of the deceased person, which will be identified, and the signature of the defendant, which will also be identified, and I shall submit that that will be evidence that the defendant did in fact conduct the sale. Then I have medical witnesses who will prove that the article purchased was a well-known article, Battle's Vermin Killer; that it is universally known to contain strychnine in dangerous proportions, and that the deceased told her medical man that she had taken the article which she had purchased. The medical man will prove that the *post mortem* appearances and all the symptoms were consistent with, and only with, poisoning by strychnine. I submit to your honour upon that I shall be entitled, in the interests of the public, for whose protection this Act has been passed, to have judgment for the sum of £5 for which the action is brought.

Mr. Flux then called upon Mr. Foster to produce his poison book.

Mr. Rawlinson: I do not know whether my friend wishes to go into all these details. The poison book is here, and it is undoubtedly signed by the defendant. The complaint which is alleged against us is that we have committed an offence under section 15, and it is really upon that that I shall have to address you. This Act has been in operation since 1868, and there has never been such an action as this brought before. It is suggested that this section means that no chemist in any part of England who happens to sell poisons, as every chemist does, shall be allowed to leave his shop for five minutes on any occasion, or, if he does so, no poison is to be sold in the interval.

His Honour: Not so; if he has a properly qualified person there he may leave the shop as much as he likes.

Mr. Flux: If the learned counsel admits the facts stated in my opening I shall not have to prove them.

Mr. Rawlinson: You had better prove them. I will admit that this is our poison book, and that we sold this preparation called Battle's Vermin Killer.

Mr. Flux: May I ask the learned gentleman what he means by "our poison book?"

His Honour: He means the poison book of the chemist. Let us go to the point at once. The question turns on the 15th section. It is admitted that the defendant did sell the Battle's Vermin Killer. He is not duly qualified, that is, he is not registered.

Mr. Rawlinson: No, he is not registered.

Mr. Flux: Does the learned gentleman admit that Battle's Vermin Killer contains strychnine?

Mr. Rawlinson: I have no means of knowing that. If you have any evidence that it contains strychnine it may as well be proved.

Mr. Flux: Mrs. Housdon will prove the handwriting of the deceased.

Mr. Rawlinson: That is admitted.

Mr. Flux: I can call medical evidence to prove that Battle's Vermin Killer contains strychnine. It is proved on public documents that strychnine is a poison within the meaning of the Act of Parliament. I rely upon section 2 of the Act. I will read the whole section, if you please: "The several articles named or described in the Schedule A shall be deemed to be poisons within the meaning of this Act."

His Honour: Now let us look at Schedule A: "Strychnine and all poisonous vegetable alkaloids and their salts."

Mr. Rawlinson: If you prove that this is strychnine I will admit that strychnine is a poison.

His Honour: The point is that this preparation contains poison.

Mr. Flux: I will call the medical man who attended the deceased.

Mr. George Frederick Burroughs sworn, examined by Mr. Flux.

Do you know the article called Battle's Vermin Killer?—I do.

Do you know the contents of that article?—Strychnine.

Do you know the other ingredients?—Indigo blue, colouring matter.

What is the active principle of it?—That is strychnine.

His Honour: It is nux vomica, is it not?—Strychnine is manufactured from nux vomica.

Mr. Flux: That is the active principle of Battle's Vermin Killer?—Yes.

Cross-examined by Mr. Rawlinson.

What percentage is there in Battle's Vermin Killer?—I am not chemist enough to know.

You have never analysed this?—No.

You came here to swear to a totally different matter, as to the death of the deceased, and not as to the component parts of Battle's Vermin Killer?—Yes. I gathered there was some strychnine in it.

You have no idea as to the amount?—No.

Re-examined by Mr. Flux.

Have you any doubt that a packet of vermin killer, as such packets are sold, contains abundant strychnine for the destruction of life?—I could not say.

Have you known instances of death resulting from the use of Battle's Vermin Killer?—Yes.

Did you perform a post mortem examination?

Mr. Rawlinson: I object to the post mortem of this lady being in evidence.

His Honour: Have you any doubt that this Battle's Vermin Killer contains strychnine?—No doubt.

Have you any doubt that strychnine is a deadly poison?—No doubt.

What quantity of strychnine would kill a person?—A grain would do it.

Mr. Flux: Did you attend Sarah Godwin Housdon as a medical man.

Mr. Rawlinson: I object. I have nothing to do with this. The question is whether or not we sold poison.

His Honour: The question is whether strychnine is a poison, and whether it is contained in Battle's Vermin Killer.

Mr. Flux: Does the learned gentleman admit having sold Battle's Vermin Killer to the person whose signature appears in his own poison book? The signature is that of Sarah Godwin Housdon. I ask this gentleman whether he was the medical attendant of Sarah Godwin Housdon.

Mr. Rawlinson: I submit it is irrelevant. It does not arise out of my cross-examination.

His Honour: They have admitted that the defendant has sold Battle's Vermin Killer, that he is not a chemist, and that strychnine is a poison. Then this medical gentleman comes here and says that Battle's Vermin Killer does contain this poison, strychnine.

Mr. Flux: That is all I want. I will not call any other witness.

Mr. Rawlinson: I used the expression "not a chemist." I am told I ought to say he is not a properly qualified man. He has not passed the Minor examination which qualifies him within the meaning of this Act, but he is a chemist. The point I want to put before you is this, that the employer of this man is a properly qualified chemist, and that his other assistant, who keeps the poison book, is also a properly qualified chemist.

Mr. Flux: This offence was committed at a shop which purports to have been owned by a duly qualified chemist.

Mr. Rawlinson: Before I deal with the authorities on the point I wish to point out what you are asked to do in this case. You are asked to translate these words, "it shall be unlawful for any person to sell, or keep open shop for retailing, dispensing, or compounding poisons, or to assume or use the title chemist and druggist, or chemist or druggist, or dispensing chemist or druggist, in any part of Great Britain, unless"—and so on, in this way, that though the chemist who keeps the shop, who gets all the profits of the shop, and whose name is above the door, is a properly qualified chemist, and therefore makes up the very article which is sold, or at all events knows what the ingredients are, yet if his servant is not also a properly qualified chemist he is liable to a penalty for selling poisons. This Act was passed in 1868, and I know of no sort of action brought under this section by the Pharmaceutical Society before. It has been the invariable custom for a chemist who is conducting a big business to leave an assistant to retail over the counter poisons. Such a sale is on account of the principal who keeps the shop. I submit that those words "any person to sell or keep open shop" were never meant to apply to the servant who sells the article, but were meant to apply to the person who keeps the shop, and who really is selling the poison in question. I emphasize that point, because I say for more than twenty years that Act has been in operation, and no proceedings have been taken under that section. It would be a very serious matter indeed if your honour now holds for the first time that this section is to apply in that way. I should like to add one further word. This is an action for a penalty, and I submit to your Honour that the statute must be clear and the words express to show that the person acting in this way is liable to the penalty. There is no doubt that the Act might be very much clearer. It says, "For any person to sell or keep open shop for retailing, dispensing or compounding poisons, or to assume or use the title chemist and druggist." They are all offences, I submit, *ejusdem generis* with carrying on a shop without a properly qualified manager. The object of the Act is this, that there shall be some properly qualified person in charge of the shop who knows what poison there is in the different articles he is selling, and it was never meant to apply, and certainly has never been made to apply, to any unfortunate apprentice who sells in the absence of his master some six-pennyworth of vermin killer. There is no authority directly on the point; but there is one case reported in the House of Lords in which there is an *obiter dictum* of Lord Selborne's on a totally different state of facts.

His Honour: It was held there that a corporation was not a person, and therefore did not come within the Act. There they kept a qualified person to sell poisons, though of course the corporation was not registered as chemists and druggists. In the court below it was held that the corporation was liable to the penalty; that was reversed by the court above, and the House of Lords approved of the decision of the Court of Appeal. They held there the simple point that the corporation was not a person.

Mr. Rawlinson: The object of course there was to prove that the person who employed a qualified person was not liable if the person who sold was duly qualified. There are various remarks of Lord Selborne at the end of his judgment which show that he had in his mind the case where there was a qualified employer and an unqualified employé. In construing the section which he is there dealing with, section 16, he says: There is "a special provision for the case of individuals carrying on that kind of business who may die, and whose executors or trustees, not being themselves qualified, might desire to carry it on after their deaths. It is true that the legislature has, in that case required, for the benefit of the public, this safeguard that there shall be an assistant duly qualified; but the legislature shows that, having that case in view, it was not thought necessarily inconsistent with the object or policy of the Act that the principals or proprietors of the business, the persons deriving profit from it, to whom those actually selling the drugs would be responsible should be unqualified persons, provided that there was in the business a duly qualified assistant. It by no means follows that all the drugs would necessarily be sold by that duly qualified assistant; or that he might not be, as in this case, under the general superintendence of a manager not himself duly qualified; all that is left open. It is, at least, not thought indispen-

sable that the persons carrying on such a business should themselves, without exception, be duly qualified." Therefore, it by no means follows that the drug would necessarily be sold by that person. He assumes there that no offence would be committed. This is an entirely new point. He assumes there that under section 16, if the business were conducted by a duly qualified chemist, certain work might be done by an unqualified assistant, who might sell these things, provided there was proper management of the shop at the time. Then again there is the case of Templeman *v.* Trafford in the 8th Queen's Bench Division. That is under the other section. Referring to section 15 Mr. Justice Grove says this: "Light is thrown on the construction of that section by section 15, which enacts that any person selling or keeping open shop for retailing, dispensing, or compounding of poisons, not being a duly registered person, shall be subject to certain penalties. The word 'sell' there is in one sense contra-distinguished from the words 'keep open shop,' and so possibly may apply to sales which are not in open shop." That is Mr. Justice Grove's reading of the section. He never suggested for a moment that the word "sell" within the meaning of that section was to apply to people who had properly qualified persons over them, but he suggested that it was meant to apply to persons who made sales outside the open shop. I say the Act being a penal Act should specify the offence clearly and definitely; and that is not done by this Act. Further I say, as a very strong corroboration of my reading of the Act, this penalty has never been enforced for twenty years. The Pharmaceutical Society is not idle in its work, it enforces such penalties as it is entitled to, but it has never attempted to enforce this one.

Mr. Flux: I do not know what authority my friend has for saying this. We have a contest here to-day, but there have been cases which have not come into court.

Mr. Rawlinson: The authority which my friend relies upon in the House of Lords is very much qualified, if not entirely taken away, by the end of Lord Selborne's judgment, where he clearly anticipates such a state of things where there is a properly qualified assistant, though the actual sale is conducted by an apprentice. I do not know whether your honour sees the terrible result that might ensue from a decision against my client.

His Honour: No, I do not see it. The Act says he must not sell poisons unless properly qualified. I do not see where the hardship is.

Mr. Rawlinson: It would be a great hardship on many chemists in country places. No doubt in some small towns chemists have no assistants or apprentices at all. The Act is meant to meet the evil of selling poisons made up by persons who do not know what they are selling. Here you have simply the case of a boy left to do the sale over the counter. The thing is made up before that, and all the proper formalities are gone through. Section 17 is hedged round with formalities as to what you are to do; you are to take the name and address of the purchaser, and put the article up in a certain bottle with a certain label. There is no suggestion that these formalities were not carried out here.

Mr. Flux: Oh, yes.

Mr. Rawlinson: There has not been up to this moment any suggestion of any offence committed by us under the 17th section. It is not pleaded, and my friend cannot, therefore, now raise that point.

Mr. Flux: I will tell you what it is if you wish.

His Honour: Section 17 is not before me at all. It is section 15.

Mr. Rawlinson: I say section 17 is hedged round with formalities, but up to the present time there has been no suggestion that we have in any way infringed that section. The public are protected by that section, and if we had offended against it that would be another matter. This is a made-up article well known to the proprietor of the shop, who would have sold it in the same way had he been there himself. He would have sold it at once, taking the person's name and address in the same way. I do ask your honour to hold that this is not an offence which was meant to be struck at by the Act. What was meant to be struck at was the danger of making up articles with poison in them by an unqualified person. That is the offence which is aimed at by the Act, and not merely selling made up articles across the counter. The 15th section is simply against persons who have the management of a shop, and who sell in the way of getting profit for what they sell.

His Honour: This is an action brought to recover a penalty of £5 under the 15th section of the Pharmacy Act of 1868. That Act says that any person who sells poison not being a duly registered pharmaceutical chemist, or chemist and druggist, shall be liable to a penalty of £5. That means that the person who sells, whether he be master or servant, is struck at by the 15th section. I think, therefore, there must be judgment for the plaintiffs for £5. As this is the first case on the point I hope it will go to a higher court.

Mr. Flux: We shall be well pleased to afford all proper facilities for doing that.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Gorse Seeds.

Sir,—I notice in a recent issue of the *Pharmaceutical Journal* the sad experience of Mr. George Welborn after making a meal off about eighty seeds of the *Ulex Europœus*. It is well known that many of the seeds of the Leguminosæ, especially all the genus *Cytisus*, are highly poisonous. Several cases are reported of long and dangerous illness after taking decoctions of the bark and the seeds of the common laburnum, both producing severe vomiting and great prostration. The seeds of the common broom have produced similar results.

Moral: In your walks abroad take your luncheon with you, or trust to the bread and cheese of the modest wayside inn.

Norwich. Octavius Corder.

Esbach's Test Solution for Albumen.—The following reply to a request for a formula for the above solution has been received from Mr. R. H. Cripps. Similar answers have been received from Mr. C. Arthur, Mr. E. A. Onyon and T. M.

Picric acid	10 grams.
Citric acid	20 grams.
Distilled water to	1 litre.

Dissolve the picric acid in about half the water (hot), add the citric acid, make up to a litre with cold water and filter, if necessary.

Erratum.—In the list published last week, on p. 380, of officers of the British Pharmaceutical Conference elected at the recent meeting in Newcastle, the "Other Members of the Executive Committee" were incorrectly given. The names should have been:—R. H. Davies, D. B. Dott, A. W. Gerrard, J. R. Green, E. M. Holmes, W. Kirkby, N. H. Martin, F. Ransom and G. S. Taylor.

Inquirer.—A copy of the regulations of the Boards of Examiners may be obtained on application to the Secretary, 17, Bloomsbury Square.

Communications, Letters, etc., have been received from Messrs. Pflugge, Nicholls, Arthur, Salmon, Dalglish, Wood, Milne, J. H.

NOTE ON NARCEINE.

BY P. C. PLUGGE, PH.D., M.D.
Of Groningen, Netherlands.

Dott's paper on "Narceine and Its Salts,"* has directed my attention to an earlier paper of Merck's on "Chemically Pure Narceine."† Merck, after describing some experiments concludes: "This behaviour stands in contradiction to the assumption hitherto current that narceine is a very weak base," and farther on: "chemically pure narceine, contrary to previous statements, possesses a faintly alkaline reaction." Being convinced of the correctness of both rejected assumptions, I feel obliged to defend my opinion, which is more in harmony with Dott's.

To Dott's remark "that Merck, like many other German chemists, ignores the work done by English and French chemists," I can add, that Merck seems to be equally ignorant of the work done by a Dutch chemist, even after the publication of the results of his work in a wide-spread German journal. However, my paper on opium alkaloids seems also to be unknown to Mr. Dott. Otherwise this author would probably have strengthened his refutation of Merck's conclusions in respect to the strength of the base narceine with some of the results of my investigations on opium alkaloids.

I entirely agree with Dott that the tendency to form basic salts is no proof of strength; and in my opinion the somewhat strange experiment of Merck with narceine, moistened with acetic acid, etc., is of no value in settling this question.

Referring for further particulars to my circumstantial exposition in the *Archiv der Pharmacie*,‡ I will here shortly repeat the data on the strength of which I have divided the opium alkaloids into strong and weak bases, and have classed the narceine with the last-named group.

I. Differing from all other alkaloids, also from morphine, codeine and thebaine, the three weak opium bases, narcotine, papaverine, and narceine, have no blue-colouring action upon a solution of red litmus, nor any power of neutralizing acids. Therefore, the acid in the solutions of salts of those alkaloids can be estimated with alkali-lye and litmus tincture, as well as in solutions of free acids.

This is demonstrated by the following experiments:—

A. Experiment with $\frac{1}{100}$ Normal Solutions.

1. Forty c.c. diluted hydrochloric acid are neutralized by 41·7 c.c. NaOH solution.
2. Forty c.c. diluted hydrochloric acid, after saturation with *narcotine*, are neutralized by 41·5 c.c. NaOH solution.
3. Forty c.c. diluted hydrochloric acid, after saturation with *papaverine*, are neutralized by 42·2 c.c. NaOH solution.
4. Forty c.c. diluted hydrochloric acid, after saturation with *narceine*, are neutralized by 42·0 c.c. NaOH solution.

B. Experiments with $\frac{1}{10}$ Normal Solutions.

5. Ten c.c. diluted sulphuric acid are neutralized by 9·65 c.c. NaOH solution.
6. Ten c.c. diluted sulphuric acid, after dissolving 268 mgrm. *narcotine*, are neutralized by 9·65 c.c. NaOH solution.
7. Ten c.c. diluted sulphuric acid, after dissolving 300 mgrm. *papaverine*, are neutralized by 9·7 c.c. NaOH solution.
8. Ten c.c. diluted sulphuric acid, after dissolving 300 mgrm. *narceine*, are neutralized by 9·7 c.c. NaOH solution.

C. Experiments with other Alkaloids and $\frac{1}{10}$ Normal Solutions.

9. Ten c.c. diluted sulphuric acid are neutralized by 9·65 c.c. NaOH solution.
10. Ten c.c. diluted sulphuric acid, after dissolving 250 mgrm. *morphine*, are neutralized by 1·7 c.c. NaOH solution.
11. Ten c.c. diluted sulphuric acid, after dissolving 299 mgrm. *codeine*, are neutralized by 0·6 c.c. NaOH solution.
12. Ten c.c. diluted sulphuric acid, after dissolving 308 mgrm. *cinchonine*, are neutralized by 4·6 c.c. NaOH solution.
13. Ten c.c. diluted sulphuric acid, after dissolving 300 mgrm. *chinine*, are neutralized by 6·0 c.c. NaOH solution.
14. Ten c.c. diluted sulphuric acid, after dissolving 200 mgrm. *strychnine*, are neutralized by 3·9 c.c. NaOH solution.

While the weak bases possess no neutralizing power at all, the alkaloids named *sub.* C. neutralize a corresponding part of the strong acid, as well as the NaOH solution.

Morphine.—$C_{17}H_{23}NO_3 + H_2O = 303$, consequently 250 mgrm. morphine = 7·69 c.c. NaOH solution. Therefore in experiment 10 C. I must have a quantity of uncombined acid corresponding with 1·69 c.c. NaOH solution; really 1·7 c.c. more used.

In a second series of experiments a fixed quantity of the alkaloid salt, with a definite quantity of acid, was dissolved in water; this solution being coloured by litmus tincture, NaOH solution was added until a distinct blue colour had appeared. From the quantity of NaOH solution (9·65 c.c. = 0·0365 gram HCl) the amount of acid was calculated. While the weak opium-bases have no neutralizing power on acids, and no influence on the colour of litmus, the quantity of acid found by titration with NaOH must be the same as that calculated from the formula.

1. *Hydrochlorate of narcotine* containing 7·718 per cent. HCl.

Taken 400 mgrm. with 30·87 mgrm. HCl, dissolved in about 30 c.c. water. This solution needed for neutralization 8·4 c.c. soda solution = 30·66 mgrm. HCl.

2. *Hydrochlorate of narceine* containing 6·9076 per cent. HCl.

Taken 368 mgrm. with 25·32 mgrm. HCl, dissolved in 50 c.c. water; used 6·8 c.c. soda solution = 25·72 mgrm. HCl.

3. *Hydrochlorate of papaverine* containing 9·809 per cent. HCl.

Taken 400 mgrm. with 39·24 mgrm. HCl. Used 10·4 c.c. soda solution = 39·34 mgrm. HCl.

All other alkaloids show very different results. Out of several experiments I will quote here only one:

4. *Nitrate of strychnine* containing 15·87 per cent. HNO_3.

Taken 326 mgrm. with 51·73 mgrm. HNO_3, dissolved in 40 c.c. water. While this quantity of uncombined nitric acid would require nearly 8 c.c. of the soda solution, in the proof the first drop of the natron-lye already caused a deep blue colour.

II. Another ground for my division of opium

* *Pharm. Journ.*, [3], xx., 335 (Oct. 26, 1889).
† *Ibid*, [3], xix., 1035 (June 22, 1889).
‡ *Archiv d. Pharmacie*, xxiv. (1886), 993; xxv. (1887), 45, 49, 421, 793 and 805.

bases into *strong* and *weak* ones is the phenomena shown by its salts with respect to the alkali salts of organic acids.

The strong bases (morphine, codeine and thebaine) are not precipitated by the solutions of the alkali salts of organic acids (acetates, oxalates, tartrates, benzoates, etc.), but from the solutions of narcotine, papaverine and narceine salts the pure alkaloid is precipitated, while these weak bases (R) do not combine with the weak acid :

$$RHCl + CH_3COONa = NaCl + CH_3COOH + R.$$

III. The weak bases, narcotine, papaverine and narceine are also precipitated from the solutions of their salts by the solutions of pure $NaHCO_3$, while the strong bases, morphine and codeine, remain in the solutions.

IV. Treated in solution with alkali chromates, ferro- and ferricyanides of potash, narceine appears to belong to the weak opium alkaloids.

The fact that narcotine, papaverine and narceine can be separated from the acid as well as from the alkaline solution, by shaking these solutions with benzol, chloroform, etc., after the method of Dragendorff, while the three other opium alkaloids, morphine, codeine and thebaine, can be isolated only by shaking the alkaline solution, places narceine in the group of weak bases.

Concerning the adulteration of commercial narceine maintained by Laborde, I, in accordance with Mr. Dott, think it highly improbable that narceine would be sent out so contaminated, even with the opium alkaloids, morphine and codeine, most widely differing from narceine.

Moreover, several experiments on animals with the different opium bases make it very difficult for me to understand how the activity of the alkaloid could be weakened by the presence of morphine and codeine.

To conclude, I am of opinion that both Merck's impugning the generally acknowledged weakness of narceine and Laborde's assertion concerning the impurity and consequent inconstant therapeutical action of this alkaloid are not founded in truth.

The commercial hydrochlorate of narceine I used for my experiments was procured from E. Merck in Darmstadt in 1886. A careful investigation showed me that this salt was pure. After combustion the platinum double salt gave 14·548 per cent. Pt, while the formula $(C_{23}H_{29}NO_9,HCl)_2PtCl_4$ contains 14·563 per cent. Pt, and Hesse found 14·52 per cent. Pt. An adulteration with morphine or codeine, whose platinum double salts contain 19·966 resp. 19·048 per cent. Pt, would, therefore, have been highly perceptible by largely influencing the residual quantity of platinum.

THE PARIS UNIVERSAL EXHIBITION.

(*Concluded from page* 324.)

New Caledonia.—The most conspicuous objects in this collection are the specimens of nickel and copper minerals and a large nickel dish about eighteen inches in diameter. There are also some fine kauri, araucaria and other resins, dark-blackish "beche de mer," and turmeric powder. Several species of dammara are given as the sources of kauri resin in New Caledonia. These are *D. Cornui*, Raoul, the "Metea" or stunted kauri pine; *D. lanceolata*, Lindl., the "Berairou," "Bora," or red kauri; *D. Moorei*, Lindl., or "Duou;" *D. ovata*, Moore, or "Ninourai;" the white kauri, *D. lanceolata* and *D. ovata* being the chief sources. Plants of all these are exhibited in the portion of the French Colonial Exhibition devoted to living plants. Sandal wood, the produce of *Santalum austro-caledonicum*, from Dumbea, and essential oils derived from this sandal wood tree, from the "santal musqué," (*Beilschmiedea odorata*); the oils of vetivert, of citronelle, and of *Melaleuca viridiflora* (a species closely allied to cajeput, and considered by some botanists to be a mere variety of *Melaleuca Leucadendron*), are also exhibited.

Norway.—In this Court there is another interesting series of cultivations of ferments having industrial importance, exhibited by Ringmer and Co., of Christiania. Among them may be seen the *Oidium lactis*, *Torula rosea*, *Penicillium glaucum*, *Monilla ætherica*, *Saccharomyces cerevisiæ* and *S. Pasteurianus*, or "wild yeast." There are also exhibits of cod liver oil by Jensen and Co., and several other houses less known in this country. The "Commission Norvégienne" exhibits a collection of natural medicinal cod liver oils, bleached by steam and clarified by cold. Glue extracted from the heads and entrails of the fish is shown as a material that might advantageously replace ordinary glue for some purposes and especially in the paper industry.

Réunion.—This colony contributes a most interesting collection. One of the most noticeable features in the exhibit is the abundance of very fine vanilla, in bundles. Of this product there are no less than thirty-three distinct exhibits, which seems to indicate that the cultivation of this valuable plant is still being carried on successfully in the island. Then there is also mace in rich red and yellow tints, together with nutmegs, cloves, and clove stalks. Liberian coffee is shown, as well as "café Leroy," a small berry from *Coffea Laurina*, and another berry from "*Mussænda borbonica*," brought forward by M. Lapeyrère, pharmacist, of St. Denis, as a new substitute for coffee, which it resembles in appearance, though smaller. Some cinchona bark is exhibited, although the cultivation experiment can hardly be profitable under present conditions; and among other articles noticed were cocoa, haricots (red, white, black and green), sago flour, honey in wine bottles, sugar, alcohol, rum, wines and essential oils of *Geranium roseum*, *Andropogon muricatus* (vetivert), patchouli and *Panicum altissimum*. Lastly, there is in the gallery a most interesting collection of native drugs, in bottles, carefully labelled with full particulars as to their sources and uses, contributed by M. Julien Potier, the Director of the Réunion Botanic Gardens, at St. Denis.

San Salvador.—In this Court but few medicinal products were visible. The information given concerning them in the official catalogue is not very satisfactory, the botany especially being particularly weak. Thus copalchi bark (*Croton pseudochina*) is referred to the Loganiaceæ. Amongst the drugs exhibited are guaco (*Mikania guaco* and other species), used as an antidote for snake bites, four or five drops of the juice of the roots being the dose for an adult. It is also employed as a sudorific and diuretic in diseases of the bladder and in intermittent fevers. A plant named "graciola," of which the botanical name is given as

Gratiola "abortiva," is said to be employed to prevent abortion and to restrain uterine hæmorrhage and chronic diarrhœa. The sarsaparilla shown has a quadrangular stem and appears to be identical with that of Guatemala. The balsam of *Liquidambar styraciflua* (attributed to "*Styrax officinalis*") is said to be much employed in Salvador in veterinary medicine. *Cassia fistula*, contrayerva, *Lippia dulcis*, vanillin, guaiacum, tamarinds, *Spigelia anthelmia*, and cedron seeds are amongst the better known drugs used in San Salvador. Two plants, named respectively copapayo ("*Arum fluvialis*") and nance (*Malpighia punicifolia*) were not noticed in other collections; the former is stated to be used in rheumatism and the latter in dysentery and other intestinal complaints. There is also mechoacan root, employed by the natives as a purgative in the form of powder, tincture and extract, but considered less efficacious than jalap. It is referred to *Convolvulus Mechoacan.*

Senegal.—This country exhibits many products of pharmaceutical interest, but they are neither well arranged nor carefully labelled. Thus there is gum (of *Acacia Verek*), castor oil seeds, sesamum seed, arachis pods, isinglass, a collection of medicinal plants in small bundles, used by the natives, copal, caoutchouc and beeswax. In the part of the grounds devoted to plants Senegal is represented by specimens of the gum arabic trees, *Acacia arabica*, Willd., *A. tomentosa*, Benth., *A. nilotica*, Benth., *A. indica*, Benth., *A. krausseana*, Benth., and by the oil or fat-bearing trees, *Bassia Parkii*, Don., *Carapa touloucouna*, G. and B., and *Telfairia pedata*, Hook. The African or Gambia kino tree, *Pterocarpus erinaceus*, is also exhibited. Another interesting plant is *Sarcocephalus esculentus*, Afz., the root of which is used as a tonic in many parts of Africa.

South African Republic.—Only two or three articles in this court call for notice. These are a gray bark represented as useful for tanning purposes; "wild indigo;" but probably not from *Baptisia tinctoria*; "witgat root," said to be used as a substitute for coffee; a tea substitute; and small lump of "india-rubber," without any indication as to the plant from which it is derived. There are also some dried apricots and pears, but these are not very tempting in appearance.

Switzerland.—In this Court, which contains a number of specialties, are to be seen Norwegian tar, starch and artificial gums, wax, honey and honey wine.

Tahiti shows kava kava, coprah and arrowroot from *Tacca pinnatifida*, starch of *Artocarpus incisa* and *Inocarpus edulis* and *Mannihot Aipi.*

Tunis.—Undoubtedly the highest and most general interest will be bestowed in this court upon the beautiful models of ruins still existing on the site of the once powerful city of Carthage and the large collection of relics that have been discovered during the excavation by which the ruins were laid bare. But only one article appears among these which is of special interest to pharmacists, and that is a fine metal mortar, about fifteen inches high and twelve inches in diameter at the top. In the exhibits of products, however, the court presents considerable resemblance to the Algerian court. Calamine is shown in variety. There are numerous vegetable drugs, among which may be mentioned calumba root, valerian root, ceterach rhizome and stem, sarsaparilla, *Inula dysenterica*, orris root, couch grass root, mallow root, ginger, liquorice, squill, euphorbium stems; belladonna, aconite, stramonium, mandragora, conium, henbane, verbena, tussilago and senna leaves; rosemary, centaury, fumitory, origanum, *Thymus Serphyllum*, chamomiles, tansy flowers and herb, laurel berries, fenugreek, colocynth, *Cassia fistula*, angelica; coriander, fennel, caraway and cumin fruit, and harmel and nigella seeds, galls, orange peel and pomegranate bark. Tunis appears to be also developing an industry in essential oils, those shown being the oils of lavender, eucalyptus globulus, thyme, marjoram and rosemary. For the table the country contributes olive oil, cayenne pepper, maccaroni, honey, sorghum sugar, dates, sweet and bitter almonds, spanish nuts and carob beans. Cork and sponges are also shown. One of the drugs pertaining rather to ancient than to modern pharmacy is shown in this Court, viz., *Cytinus hypocistis*, a root parasite of the cistus, which possesses powerfully astringent properties. Many of the above products are not to be looked upon as articles of export, but rather as indicating the drugs used in the country.

United States.—In this court, as illustrating the attention now being paid to the growth of *Sorphum saccharatum* as a sugar material, may be seen upwards of fifty varieties of sorghum seed, white, yellow, brown and black. There is also some good looking honey.

Venezuela.—In this Court there were several objects of pharmaceutical interest in the form of roots, resins, barks, seeds, etc., but no information was obtainable concerning them. Carapa fruits (*Carapa guianensis*), common also to British Guiana and to Western Tropical Africa, were represented. The bitter oil of these seeds, which is used as an insecticide, has been frequently mentioned in Exhibition reports. Under the name of "resine de chaparro," a product having a fragrant odour like that of *Humiria balsamifera*, or perhaps more closely resembling that of ladanum, was exhibited. *Palo santo*, an aromatic bark, apparently derived from a species of *Croton*, cucharo bark, the fruits of *Thevetia neriifolia*, a white copal resin, and fruits of the "balsam of tolu tree," but more resembling those of *Myrospermum frutescens*, attracted attention. Fine large tonka beans, well covered with crystalline powder, jequirity seeds, sarsaparilla, coca, and a few other well known drugs were also noticed. A very curious product exhibited in the Venezuela Court is the wax (*in situ*) of *Coccus Axin.* It was shown in small pellets rather larger in size than an ordinary pea, usually containing inside the skin of the insect producing it. The wax itself is white and easily breaks up into thin lamellæ. In the fresh state it is said to be of a yellowish tint, moderately soft, and to possess a slightly rancid odour. It melts at 35° C., is soluble in strong boiling alcohol, and in ether, chloroform, benzin and oil of turpentine is easily saponified, and absorbs oxygen with remarkable avidity, becomes hard, brownish and insoluble in alcohol and ether. The specimens in the Exhibition were, however, dirty white, not brown, although hard and somewhat brittle. The insect is found also in Mexico (in Uruapam, Yucatan, Tlacotalpan, etc.), living on the *Spondias Mombim*, *S. rubra* and *Xanthoxylon Pentanome* and *X. clava-Herculis.* In commerce in Central America the

wax is met with in masses of about 350 grams wrapped up in maize leaves. It is used in erysipelas, and as a resolvent and vulnerary. It is applied externally in rupture and in metrorrhagia and other uterine affections in the form of a plaster. In the arts it is employed to make lacquer for metals, and it is stated to remarkably brighten colours mixed with it. The melted wax heated to 250°–350° F. for an hour, becomes tough and flexible, and is no longer soluble in turpentine. From its peculiar properties it seems worthy of further chemical investigation.

OIL OF MAIZE.*

BY CHARLES EDWARD BOWERS, PH.G.

To extract the oil from the seed, corn was taken in the different stages of its growth to ascertain at what age it contains the largest amount of oil. The corn was carefully dried, after which it was removed from the cob, reduced to a coarse powder, and percolated with petroleum ether to remove the oil. The youngest specimen tried contained 1 per cent. of its weight of oil. The amount gradually increased with the age of the corn until the maximum was reached in that which was allowed to fully ripen and dry upon the stalks. The amount yielded by such corn was 3·16 per cent.

The oil is said to reside entirely in the embryo or germ of the corn, and to ascertain if such be the case a portion of the corn was carefully deprived of its embryo, coarsely powdered and percolated with petroleum ether; no oil was obtained. The germs, on the other hand, freed from all integuments and treated in the same manner yielded 22 per cent.

As obtained, the oil was of a pale yellow colour and had a somewhat thicker consistence than either cotton-seed or olive oils. The odour was slight but peculiar; its taste not unpleasant, bland and oleaginous; its specific gravity ·917. It is a fixed oil, belonging to the group of non-drying, and is well adapted for lubricating purposes. It is soluble in all proportions in ether, bisulphide of carbon, chloroform, and benzin; very sparingly soluble in 95 per cent. alcohol, forming a milky mixture when shaken with that body, which separates on standing into two layers, both of which are perfectly transparent. The oil readily saponifies with so weak an alkali as lime water, and with potassa or soda it forms a white soap. A thin layer of the oil exposed to the air for several weeks did not show any rancidity and to all appearances remained unchanged. In this respect it compares favourably with the oils of rape seed, olive, etc.

Upon strongly heating, the oil emits characteristic smoky, irritating and very disagreeable vapours, somewhat similar to those produced in the heating of cotton-seed oil. It therefore would not be tolerated as an adulterant to lard, because the odour developed upon heating would certainly betray its presence. Lard itself is decomposed at high temperatures, but the odour produced is entirely distinct from that produced when oil of maize is associated with it.

It could not be used to adulterate olive oil, as it gives different results with all the tests for the identity of that body. With concentrated sulphuric acid it instantly darkens. Immersed in a freezing mixture of ice and salt, it did not deposit a granular substance, and remained nearly transparent, but became very notably thicker in consistence, so much so that it was scarcely mobile. The probability is that it consists largely of olein.

It is more easily absorbed by the skin than cotton-seed or olive oils, and is an excellent vehicle for external applications. It also dissolves camphor with more facility than those oils.

* From the *American Journal of Pharmacy*.

Numerous preparations of the Pharmacopœia were made by substituting oil of maize where cotton-seed oil is directed, to ascertain whether it is capable of replacing that body. The results were very satisfactory in every case. In some instances its superiority over cotton-seed oil was very well marked. In the preparation of ammonia liniment this feature was most prominent. The oil readily saponified on the addition of the ammonia water, forming a smooth, creamy mixture, which did not become curd-like or separate on standing, as is frequently the case with the officinal liniment of ammonia. Examined at the expiration of two months, no changes could be observed, and it was apparently as perfect as when first made.

The oil could be adapted to table use as a dressing for salads, etc., and could readily take the place of those oils now used for such purposes. Taken internally in the dose of a fluid ounce, it gives no medicinal effects other than those possessed by olive oil.

It is said that this oil is already an article of commerce in some of the western States. It is a by-product in the manufacture of starch. Where corn is used as the source of that substance, it becomes an object to get rid of the oil-bearing germs, and this is done by the aid of machinery, which separates the starchy portion of the corn in one direction and the germs in another. The germs are then freed from adhering integuments as far as practicable and subjected to the action of steam, after which the oil is removed by the aid of hydraulic pressure.

VITTÆ OF UMBELLIFERÆ.

A careful description has recently been given by Herr A. Meyer of the vittæ, or receptacles for volatile oil, which are almost invariably found in the pericarp of ripe fruits of Umbelliferæ, and which give them their peculiar flavour and odour. These vittæ are clothed with a peculiar layer which is itself protected by a special cuticle-like membrane, which completely covers the outer surface of the epithele, the whole forming a sac enclosing the special secretion. In only a few species (*Coriandrum sativum*, *Lagoëcia cuminoides*) is this sac entirely unseptated; in a few others (*Heracleum sphondylium* and *caucasicum*, *Sison Amomum*, *Æthusa Cynapium*) it is imperfectly septated; in the great majority of umbellifers the sac and its investing layer are divided into a number of chambers. The layer itself consists of a peculiar substance, the exact nature of which is not yet determined; but it is neither a carbohydrate, a fatty oil, a resin, nor a caoutchouc-like substance, as is shown by its microchemical reactions. In some species, between the thick septa and the parietal layer is a ring of irregular thick-walled vacuoles. In *Conium maculatum*, where the vittæ are only rudimentary in the ripe fruit, the peculiar layer is wanting. In one species only where the vittæ are well-developed, *Johrenia græca*, is the aromatic secretion altogether wanting, and replaced by a solid substance. In *Astrantia major* and *Eryngium maritimum*, where the fruit is but slightly aromatic, the vittæ have no layer, but instead of it a fluid secretion. At a very early period in the formation of the vittæ, even in the flower-bud, substances of two different kinds are exuded from the walls of the epithelial cells into the vitta, viz., a watery fluid, and a volatile oil insoluble in water. The vittæ themselves always result from the enlargement of intercellular spaces, not from the absorption of cell-walls. The object of the layer above described is clearly to retain the secretion in the vitta and to prevent its flowing into the surrounding tissue. The anise oil contained in the vittæ of *Fœniculum officinale* and *Pimpinella Anisum*, and the carvol in those of *Anethum graveolens* and *Carum Carui*, are highly poisonous to birds.

The Pharmaceutical Journal.

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Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

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THE MEDICINE STAMP ACT.

IN accordance with the notice which appeared in last week's Journal, a meeting was held last Wednesday in the County Hotel, Newcastle, to consider the subject of the Medicine Stamp Act as affecting the business of chemists. The chair was taken by Mr. B. S. PROCTOR, and the report of the Committee, which had been previously circulated in a printed form, was taken as read. The Chairman, in moving the adoption of the report, called attention in the first place to Dale's Plaster, and in answer to the statement of the Board of Inland Revenue that "there can be no doubt of its liability to stamp duty as a nostrum or proprietary medicine," declared that was not the case, since he doubted it, and in fact was not the only person who doubted it. In answer to the Board's statement that "the use of the possessive case, with the title or description of Dale's Plaster clearly puts the article forward as proprietary," Mr. PROCTOR declared that he knew many instances where the possessive case did not imply that. Lastly, in answer to the further statement that cases have been brought to the Board's notice in which persons "claimed the exclusive right and title to make these plasters," he asked why this argument should have been resorted to if the first was a good one. In his opinion it was simply because both arguments were bad. In Mr. PROCTOR'S further remarks he drew attention to the points brought out in the report of the Committee, as proving in his opinion that the judgments of the Board of Inland Revenue as to liability to medicine stamp duty were uncertain and contradictory. He relied upon those illustrations as showing that the Inland Revenue authorities are unable clearly to define the law, but seem to be guided in their interpretation by expediency rather than by principle. On that ground he contended that the Medicine Stamp Duty ought to be abolished. The adoption of the report was then seconded by Mr. WEDDELL, and supported by Mr. RIDDELL, and carried.

Mr. WEDDELL then moved that since the Acts under which duty is charged involve unnecessary and vexatious interference with the conduct of the drug trade, and an unwise obstruction of the use of desirable information on the labels of medicines, Parliament should be petitioned for a repeal of them. Mr. HARRISON, in speaking on this motion, agreed that the law was in a most unsatisfactory condition, but though he did not think medicines pure and simple should be liable to stamp duty, he believed the public were agreed that so called "patent medicines" ought to be liable. As a practical man he was therefore inclined to take the Act, bad as it was, and seek to amend it in the direction laid down in the Act itself, by making the exemptions more extended and more clear than they are now. With that view he moved as an amendment "That steps be taken to secure exemption from medicine duty of preparations made according to the formulæ of any British or foreign pharmacopœia, and described and sold as such, and all medicines for which there is not claimed either exclusive right or secret process of manufacture." He believed that such an alteration of the Act would enable chemists to carry on their business with perfect impunity. His impression was that the proper body to approach with that object was the Pharmaceutical Society. Whatever it had done, or failed to do, it was entrusted with the protection of the interests of chemists and druggists, and if they did not act with a spirit of determination they could not blame that body for not taking action. This amendment, seconded by Mr. CLAGUE and supported by Mr. DODD and Mr. RIDDELL, was then carried by a large majority, and it was agreed that a memorial embodying the terms of the amendment should be drawn up and forwarded to the Council of the Pharmaceutical Society.

In this position of the matter it would be premature to offer any extended remarks upon the report of the Newcastle Committee, or the proceedings of the meeting, beyond saying that the suggestion put forward by Mr. HARRISON is on the face of it one of a much more practicable character than that urged by Mr. PROCTOR. We venture to think that Mr. PROCTOR'S arguments for the total abolition of the medicine stamp duty would not go very far in convincing the Chancellor of the Exchequer that the demand was one to justify the sacrifice of more than £200,000 a year of imperial revenue. On previous occasions we have pointed out what we believe to be cogent reasons why pharmacists should not seek for the repeal of the stamp duty on patent medicines; but if it can be shown that the administration of the law does, by reason of vagueness or too great generality, interfere with the proper excercise of the pharmacist's business there would be a very good ground for endeavouring to obtain such an amendment of the Medicine Stamp Act as would remove any objection on that score. That appears to have been the idea embodied in Mr. HARRISON'S remarks and in the amendment that he moved.

THE WEIGHTS AND MEASURES ACT.

The Weights and Measures Act passed during the last session to amend the law relating to weights and measures, and for other purposes connected therewith, will come into operation on the first of January next, and it will be useful to remind our readers of this fact, inasmuch as the stamping of balances and weighing machines will then become compulsory according to the provisions of that Act. Last March we called attention to the general features of this measure, when the Bill was still before Parliament, and it is now only necessary to point out that the Act provides that within twelve months of its becoming law every weighing instrument used for trade purposes shall be verified and stamped by an inspector of weights and measures with a stamp of verification. Any person who uses or has in his possession for trade purposes any weighing machine that is not stamped as the law requires will after that time be liable to a maximum penalty of two pounds, and in the case of a second offence to a penalty of five pounds. The term weighing machine used in the Act is comprehensive, and is intended to apply to every description of instrument used for weighing purposes. Authorized fees are to be charged by the inspectors for the verification and stamping of weighing machines as well as weights and measures, and appended to the Act is a schedule of these fees. In a recent report by the Board of Trade on its proceedings and business under the Weights and Measures Act, 1878, it is stated that the main object of the new Act is to carry out as far as may be possible suggestions that have been made in the Board's previous annual reports, as to the necessity of further legislation for the better prevention of fraud in retail trade. The local administration of the law is left, as hitherto, with the local authorities, but the Act gives the Board of Trade certain additional powers of control. It would appear that such an extension of the executive power of the Board was requisite to make up for the deficiencies on the part of local authorities, which had been found to obtain in previous experience. In the exercise of these extended powers the Board of Trade now proposes to issue very shortly model regulations, for the guidance of local authorities in issuing instructions to their inspectors, and it is stated that in the preparation of these model regulations under the New Act, the Standards Department of the Board of Trade has received much assistance from the local authorities. At the same time a desire is expressed to consult their wishes as far as possible, and it may therefore be inferred that a more hearty co-operation has already been established between the Board and the local authorities.

In the drawing up of the proposed model regulations it is intended that they should deal not only with the general duties of the inspectors, but should also state the modes in which the work of testing and stamping may be best carried out. This will be a useful arrangement for ensuring uniformity in the conduct of this work, and for removing any ground there may have been in some instances for complaint of the capricious action of inspectors of weights and measures. Another useful feature of the new Act which has a similar tendency is the provision requiring that an inspector who is a local officer appointed by the local authority shall pass a technical examination by the central department charged with the administration of the law. One of the objects of the contemplated model regulations will be to serve as an indication to the inspectors what their technical qualifications are to be. It is highly important that the persons entrusted with the duty of inspecting weights, measures and weighing machines under the Act should possess adequate practical knowledge for the proper performance of their duties. Hitherto sufficient attention has not been given to this requirement in the appointment of inspectors, and it is satisfactory to find that it will in future be duly provided for.

It is rather noteworthy that almost simultaneously with the decision by the judge of the Wandsworth County Court that the word "sells" in the fifteenth section of the Pharmacy Act must be construed to apply to the person who actually conducts the sale of a poison, a similar decision was given in Canada under the Ontario Pharmacy Act. In that case a registered druggist residing at Beaverton, Ontario, upon leaving town for a time left his daughter in charge of the business, with a caution not to sell any poison during his absence. It was proved, however, that a detective succeeded in purchasing from her some "pink root," which is an article enumerated in the schedule to the Act, and in consequence a fine was inflicted of twenty dollars and costs. It may be added that the language of the section under which the conviction took place is very similar to that of the 13th section of the British Pharmacy Act, the words being: "No person shall sell or keep open shop for retailing, dispensing or compounding poisons, or sell or attempt to sell any of the articles," etc. The intervention of the detective is probably explicable by another provision that half the penalty inflicted goes to the prosecutor.

* * *

This week we have to report the death of another Annuitant on the Benevolent Fund, Mr. John Rogers, who was a Member of the Pharmaceutical Society from 1842 to 1867, the date of his election, having died on the 15th inst. at the age of eighty years.

* * *

The next meeting of the Chemists' Assistants' Association will be held on Thursday evening, November 28, when Mr. H. Helbing will read some "Practical Notes."

* * *

The next meeting of the School of Pharmacy Students' Association will be held on Thursday November 28, when Mr. H. W. K. Pears will read a paper on "Joule and his Work;" and Mr. A. E. Chaston will give a "Report on Materia Medica."

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

The evening meeting of the Chemists' Assistants' Association, held on November 7, was devoted to the reading of short papers.

Note on a Sample of Decomposed Chloroform.

BY A. CAMPBELL STARK.

The sample of decomposed chloroform exhibited has been kept in my laboratory for five months. During this time it has been continuously exposed to diffused, but not direct sunlight, and to a temperature ranging from 40° to 105° F. It is the product of very well known makers, and is guaranteed by them, although methylated, to answer all the requirements as to purity of the British Pharmacopœia.

The products of the decomposition of chloroform by oxidation are numerous and complex, but the principal are hydrochloric acid and chlorocarbonic acid, $COCl_2$. Free chlorine is also formed, and in the case of chloroform made from methyl alcohol an oily hydrocarbon is also produced. The sample of chloroform before you contains at least three of these compounds.

The fumes emitted are acid to test paper, and form NH_4Cl when placed in contact with ammonia. The washings of the chloroform give the well known chloride reaction with $AgNO_3$. They do not, however, bleach a feebly coloured solution of litmus, and the presence of free chlorine is therefore uncertain. Phosgene gas is decomposed by water into CO_2 and HCl, and on passing some of the fumes emitted by the decomposed chloroform into solution of calcium hydrate, a precipitate of carbonate was immediately produced. Phosgene gas is produced by the action of nascent oxygen upon chloroform (Roscoe and Schorlemmer); it is pungent and irritating to the respiratory organs, and the alarming dyspnœa produced by some samples of chloroform inhaled have been probably due to the presence of this gas.

On spontaneously evaporating 1 c.c. of the chloroform in a watch-glass drops of the oily hydrocarbon were left behind.

In November of last year, there appeared in *L'Union Pharmaceutique* an interesting and instructive paper on the "Decomposition of Chloroform," by Mons. M. H. Marty (see *L'Union Pharmaceutique*, Novembre, 1888, "L'alteration du chloroform, de ses causes des moyens de la prevenir d'y rémedier," par M. H. Marty). The author found pure chloroform to be extremely unstable under the influence of light, for pure chloroform (freed from all trace of chloral) would not remain unaffected more than two days in summer or five days in the winter when freely exposed to light. The same chloroform, however, when kept in the dark remained for more than fifteen months unaltered, although in contact with air. Pure chloroform kept in an atmosphere of pure and dry nitrogen, during sixteen months, was also quite unaltered. The author's experiments show that the decomposition of chloroform is due to the action of oxygen in the presence of sunlight. If to pure chloroform so small a proportion as ·1 per cent. of absolute alcohol be added, the chloroform, M. Marty states, does not decompose in the presence of light. Forty samples containing this percentage, were exposed by him to continuous sunlight during fifteen months, and not one was in the least degree affected. He does not mention the temperature at which his samples were kept, and as the specimen I exhibit presumably contains the B.P. proportion of 1 per cent. of alcohol the primary cause of its decomposition was probably the temperature to which it was exposed.

Such chloroform as this may be purified by the following series of processes:—

1. Twice wash with distilled water.
2. Heat with 1 per cent. of strong colourless H_2SO_4 and repeat, if necessary, until the H_2SO_4 comes down colourless.
3. Heat with solution of NaHO (of sp. gr. 1·33) in the proportion of 3 per cent. of the chloroform used, and distil.
4. Add to the distillate 5 per cent. of dried chloride of calcium, and redistil from a water-bath at a temperature of 60° to 61° C.

The above series of operations applied to 20 c.c. of the sample on the table yielded 15 c.c. of nearly pure chloroform (=75 per cent.).

Professor Regnauld gives the following as the characters of absolutely pure chloroform:—Colourless, perfectly limpid, very mobile; sweet fresh odour, which does not change during evaporation; density 1·5 at 15° C.; boiling point very near to 61° C.; placed on filtering paper does not leave any smell after the chloroform has evaporated; neutral to test paper; nitrosulphide of iron gives no coloration when a crystal of the salt is placed in the chloroform (absence of alcohol, ether and wood spirit); gives no reaction in the cold, or when heated with $AgNO_3$; does not colour when shaken with solution of caustic potash or H_2SO_4.

The specific gravity being taken to be 1·497 the above tests, with the exception of that with nitrosulphide of iron, are applicable to B.P. chloroform.

In view of the alarming symptoms that have followed the inhalation of many samples of chloroform it is evident that impurities, either original or from decomposition, are present more often than is generally supposed.

Of course such conditions as the exhibited sample were exposed to were abnormal, but it may be well to emphasize the point, so often insisted on, that the most favourable conditions for keeping chloroform with absolute safety, are to keep it in yellow glass bottles of not more than a litre capacity, and in a place of low and uniform temperature.

The President (Mr. Ellwood) said that in view of the extensive use to which chloroform is applied, it is very essential that it should be a carefully purified and stable preparation. He had often noticed that samples when tested were acid and reduced nitrate of silver, though he had not found any appreciable residue upon evaporation. Chloroform water when exposed to light gives an acid reaction, which he attributed to the oxygen dissolved in water; he had found this reaction in cases where distilled water was employed, though it required probably a month's exposure to develope the acidity.

Mr. Dymond said the sample submitted by Mr. Stark appeared to him to possess a strongly marked odour of chlorine, and he inquired if the author had specially tested for free chlorine.

Mr. A. H. Mason said that some fourteen or sixteen years ago he had worked upon chloroform, and found that chloroform made from methylated alcohol was quite equal to and often superior to that made from ordinary ethylic alcohol. The reason was that the chloro-derivatives of methylated alcohol, which accompanied the production of chloroform, were more volatile, and consequently more readily got rid of than the corresponding ethylic compounds were. He said the best part of Mr. Stark's paper had reference to the recovery of chloroform from a partially decomposed sample. Wholesale druggists and others who used chloroform in large quantities for various purposes preserved their residues, and they occasionally experienced a good deal of difficulty in recovering their chloroform from those residues. He said that "ketone chloroform" kept well under varying conditions of temperature,—and he alluded to the investigations

which were now proceeding in consequence of the ill results that had attended the administration of a sample of chloroform that had emanated from Dresden.

Mr. W. Ll. Williams said the odour reminded him of the pungency which was observable in certain samples of butyl-chloral hydrate. He could confirm Mr. Mason's remarks respecting the greater volatility of chlorinated methyl compounds, for the fact had come under his own observation in the course of a series of experiments that he had had occasion to perform.

Mr. Stark, replying to Mr. Dymond, said he did not think free chlorine was present in the sample exhibited. The irritating odour was due, he thought, to phosgene gas. He quite agreed with Mr. Mason that chloroform made from methylated spirit was quite as pure as that from rectified. He had mentioned that it was made from methylated spirit, because the makers made a special point of their methylated chloroform being equal to the B.P. standard. All makers did not do this. He had exhibited this sample to-night because it was the only case he had met with of a chloroform that had decomposed when exposed to light, and he wished to hear the opinions of the other members of the Association.

Lime Water.

BY T. A. ELLWOOD.

It has been pointed out several times, in papers appearing in the *Pharmaceutical Journal*, that lime water of commerce varies considerably in its strength; also in 1886 the Nottingham borough magistrates inflicted a penalty of £5 for having sold as lime water a solution containing less quantity than the Pharmacopœia requirements. How far is the pharmacist to blame? and what is the cause of an inferior quality?

To the first question I would answer: the pharmacist is entirely at fault, as it is very easy to obtain a B.P. preparation by following the B.P. directions. It is not, however, so easy to keep the solution of proper strength when constantly using from the bulk. But what does a qualification imply to the public, if not that they may rely upon the chemist to supply a genuine article of the legally required strength? By an occasional analysis, which is simplicity itself, it is easily ascertained whether the solution contains the required amount of lime, and if it does not it is no great loss to throw it away and prepare some more.

To the second question a more lengthy answer is required. It depends upon the purity of the lime used, the method of slaking it, and the amount of water used; the time allowed to stand before decantation from the insoluble portion; the method of keeping, and the bottle kept in.

The solubility of lime considerably decreases with rise of temperature; at boiling point scarcely half the amount is dissolved as at ordinary temperatures; why this should be the case has not yet been ascertained. It was suspected by Messrs. Shenstone and Cundall that this was due either to impurities or to the action of the lime upon the vessels used, which are usually of glass; they therefore tried an experiment, using a platinum tube instead of glass, and a very carefully prepared pure sample of calcium hydroxide. They came to the conclusion that their suspicion was wrong, and that no doubt remains on the point; calcium hydroxide is very decidedly less soluble in hot water than in cold; they were, however, unable to assign a reason for its diminished solubility.

The slaking of lime has a considerable influence upon its solubility in water; if carelessly done the result will in all probability be to make a lime water under strength. If, however, the B.P. method is adopted and the lime is good, not overburnt, there need be no fear of obtaining anything but a satisfactory solution; rather less water than is ordered by the Pharmacopœia to slake the lime is preferable.

Messrs. Nesbit and Maben have said they do not consider it necessary to have freshly slaked lime, providing the ordinary is well kept. My results lead me to conclude that freshly slaked lime is better, but that a solution of correct strength can be obtained from a carefully preserved sample if it does not contain carbonate and is less than a month old; beyond that age I find even if it contains no carbonate, its solubility decreases.

Some chemists prefer making their lime water direct from the lime (calcium oxide) itself, by simply pouring water upon it direct, and then bottling. There are several objections to this method. The lime is almost sure to contain some other soluble impurities, such as chlorides or sulphates, which in the case of calcium hydroxide are ordered to be washed away before making the lime-water. Such samples would therefore contain an excess of calcium, but not all of it in the required form, for either the chloride or sulphate would act upon oxalic acid the same as the hydrate. Further, calcium oxide possesses in a marked degree the property of forming supersaturated solutions, whereas calcium hydroxide does not. By adding lime to water small quantities at a time, and keeping a low temperature, a supersaturated solution may be made containing 20 grains in the pint, which is double the official strength.

It is a common custom in making lime water to simply add an indefinite amount of slaked lime to a bottle containing *ordinary* water, and then standing on one side until required for use, which perhaps may not be for several weeks. Such a method is very erroneous. First, ascertain whether the lime is free from chlorides by washing and testing washings with argentic nitrate; remembering also that the Pharmacopœia directs that slaked lime should be recently prepared. 2nd. Add the slaked lime to *distilled* water in definite proportions (1 to 100) and shake thoroughly for two or three minutes. 3. Adhere to directions, and decant or syphon after twenty-four hours, for the solution rather than improving will deteriorate by keeping.

Lime water should not be kept, as is very frequently the case, in the ordinary stoppered white rounds of the shop, as with the other alkalies it possesses a considerable solvent power for lead. It must be in bottles free from lead and in a cool place, and when, owing to absorption of carbonic acid, it is observed to deposit on the sides, it should be tested and only used providing it is equal to the required standard.

I append the results of a few selected analyses of commercial samples:—

No.	Vol. taken	Vol. of standard oxalic reqd.	Grains of CaO in pint.	Remarks.
1	420 c.c.	18 c.c.	10·5	
2	420 ,,	17·5 ,,	10·2	
3	280 ,,	16·8 ,,	14·7	Traces of chlorides.
4	420 ,,	5·6 ,,	3·26	
5	420 ,,	21·3 ,,	12·42	Magnesium present.
6	350 ,,	7 ,,	4	Traces of sulphates.

I understood that sample 3 was made direct from the quick lime, and hence, together with its impurities, we see the reason of so high a figure.

Nos. 1 and 2 were prepared strictly according to the B.P. No. 4 was taken direct from a white bottle on the shelves behind counter.

The reason of my working upon multiples of 70 c.c. is obvious, as it admits of an easy calculation of grains in pint, 1 m.g. in 70 c.c., corresponding to 1 grain in the gallon.

In conclusion I may remark, if pharmacists would use a little care and forethought in the preparation and preservation of their galenicals, they need never retail inferior articles.

Mr. Philp, who took the chair whilst Mr. Ellwood read his paper, remarked on the practical nature of Mr. Ellwood's paper. Lime water was a constant source of trouble on account of its extreme variability. Personally, he had found the B.P. process quite satisfactory. It was interesting to note that a water made direct from calcium oxide would contain more lime in solution than one made from the hydroxide, and thus yield a better result by volumetric estimation.

Mr. Ince said the gist of the whole matter was to implicitly follow the instructions of the Pharmacopœia, and a perfectly satisfactory article would be obtained.

Mr. Mason said if the only use to which lime water was put was to mix with linseed oil for burns a few grains more or less in the pint would be of no moment; but, as they well knew, it assumed at times a highly important position as a remedial agent, *e.g.*, in infantile diarrhœa, and it was very essential that in such cases an article of the highest strength and purity should be available.

Mr. Richards inquired if the samples reported upon by Mr. Ellwood were obtained from provincial as well as from London houses.

Mr. Dymond remarked that the results were interesting and extraordinary. That the length of time a sample of lime water was kept over lime should cause an alteration in the strength of the lime water, and that quick-lime should produce a different lime water to that yielded by slaked lime, both pointed to the formation of definite hydrates between lime and water, and at the same time showed how little we knew of those compounds and of the physical subject of solution.

Mr. Nosworthy asked if it was right to use ½ ounce of slaked lime to the gallon of water, and inquired why lime water should be prepared from the lime obtained by burning marble.

Mr. Blackham said the point at issue was how best to preserve lime water.

Mr. T. A. Ellwood said: The examples I have quoted to-night were taken from between 80 and 90 analyses, conducted by myself on lime water obtained from different retail houses in the metropolis, and in reply to Mr. Richards, I think we may take them as typical of the country generally. The cheapness of lime water does not exempt it from the "Sale of Food and Drugs Act," and as Mr. Mason has just pointed out, the medical use of it for saponifications, or for internal administration, demands that it should be of definite strength. I know what difficulties the retail pharmacist has to encounter in the estimation of his preparations, and that is the apology I make for bringing forward this paper to-night. But I would point out that it is not necessary that he should have to constantly test this preparation; the main argument of my paper is, that if properly prepared and preserved it does not require it. Mr. Blackham has touched upon the right point, in asking "How is it to be preserved?" I would in reply say: Prepare it honestly, and then keep it in green-glass stoppered bottles; ordinary Winchesters do excellently, and do not expose it to strong light. The old method of preparing it, as Mr. Richards has inferred, is the general one in the country; simply pouring water on the oxide is to be discarded on scientific grounds, and on grounds of safety to ourselves, if we wish to escape a zealous inspector. Mr. Nosworthy has asked the best kind of lime to use, referring to that prepared from marble; this certainly is the purest kind we can easily obtain, and its supply is a special point with some wholesale houses; but then as to using a quarter the quantity, certainly I say it is wrong. If the lime is purer it does not imply that less should be used. The B.P. does not mention marble lime, and as I have previously remarked, we need not wish, in this instance, to depart from our "authoritative text book." The subject brought forward by Mr. Dymond is an interesting point chemically, and worthy of further investigation, but it does not pharmaceutically affect lime water.

Methylated Spirit.

BY C. J. STROTHER.

The author called attention to the fact that notices are being served on chemists in some districts with regard to the hour at which methylated spirit may be sold, and that by Act of Parliament there is a heavy fine for selling this article between the hours of 10 p.m. on Saturday and 8 a.m. on Monday. He thought that members of the Association would do well to keep the fact well in mind, as he believed the informer gets half the fine. This legislation seemed to present such serious complications, he might almost say "a perfect trap," that he thought it right to bring the matter before the Association.

Insects in Drugs and Preparations used in Pharmacy.

BY C. J. STROTHER.

In connection with Mr. Davis's very able paper on "Bacteria," I mentioned Dohl's process of sterilization for milk, etc.

It has occurred to me that a method for preventing and destroying the insects and germs found in pharmaceutical preparations and drugs would form a very interesting subject for discussion.

We are all aware of their existence, but few of us study their habits, and I must confess to a creepy feeling when I see one of these "young gentlemen" crawling off the paper under my lens.

I will invite your attention to-night to two or three specimens that I have with me.

The first is a fair-looking sample of crushed linseed supplied about three weeks ago by one of the large wholesale firms, kept in a wooden cask with a wooden cover. Under the lens it is seen to be literally alive.

The next occurs in aconite root, and is a totally different-looking parasite.

Nux vomica and cantharides furnish the other specimens. With the last-named it is usual to put camphor, though with doubtful effect, but it is possible that washing hard substances in a solution of salicylic acid and quickly drying might protect them.

I should not have ventured to mention the subject, but the sample of crushed linseed now under the lens is in appearance, taste, touch and smell all that could be desired (to the naked eye), and the question naturally arises, what will be the effect of a poultice containing thousands of insects applied to an open wound, especially if the poultice is made with hot, instead of boiling, water.

Mr. Ellwood said an instance similar to the one brought forward by Mr. Strother, recently came under his notice. In that case the infested article was flour, and he found that the ordinary rule was simply to recharge the bin with a new sack of flour whenever the stock was low, by this means the insect was able to permeate the flour in a very short time. He thought the only remedy was to thoroughly clean out the receptacles for flour and linseed meal from time to time.

Mr. Richards said the best receptacle for linseed meal was a cask, and maintained that much linseed meal was injured by a process of fermentation brought about by heating. Referring to the use of camphor as

a means for keeping articles free from insects and moths, he thought it was esteemed too highly for the purpose. The best material to employ was naphthalene.

Mr. Mason said the linseed meal exhibited seemed to be in a state of fermentation, which might be due to a want of proper care on the part of the grinder, whereby it became heated. The appearance of the sample under the lens reminded him very forcibly of a piece of ripe cheese. It was well known that flour was subject to the attacks of minute insects which involved the owners in heavy losses. He thought camphor was unquestionably useful for preserving skins, etc. It was used in America and in other places abroad in immense quantities. Porous paper upon which some carbolic acid had been dropped was very useful, and many dealers wrapped their skins in paper which they afterwards tarred to repel insects.

Mr. Blackham believed that most chemists knew of the regulation respecting the sale of methylated spirits. He said camphor was not a parasiticide; it was of use if employed freely in protecting ergot, cantharides and such drugs as are liable to be attacked by insects, but it was useless if once the insects had obtained a footing.

Mr. Stark thought that the destructive action of mercuric chloride on most bacteria was so well proved as to be beyond discussion. It might be well to point out in view of Mr. Richard's remarks that the large collection of butterflies in the natural history museums were preserved by dipping them in a saturated alcoholic solution of mercuric chloride. After that they were found to resist anything. Naphthalene was no doubt an excellent preservative, but the smell was most objectionable.

Photo-Chemical Action.

BY W. LLOYD WILLIAMS.

The numerous phenomena which occasion the pharmacist at one time or another inconvenience and annoyance have been more or less perfectly examined at disjointed intervals, but a collection of such phenomena as are more directly traceable to the influence of light, with some generalizations thereon, may not be altogether wanting in interest nor devoid of profit.

It has been stated with much truth and terseness that "the art of photography runs considerable danger of outstripping the science;" practical details for the production of gems of photographic art may be found in abundance, but the elucidation of the principles upon which the success of the operator depends has not kept pace with this artistic progress.

One might, though in a more restricted manner, apply the same simile to pharmacy. The tendency of the day seems to be for the rank and file to devote its attention to the development of elegant pharmacy and to neglect the examination of many constantly occurring phenomena which are as yet incapable of satisfactory explanation.

Every pharmacist knows that exposure to light in the case of many substances induces in those substances changes, not only of a chemical but also of a physical nature, and it is often a difficult matter to decide as to whether a particular manifestation is the result of physical or chemical activity, or of a combination of the two.

The transformation of crystalline sulphur into its amorphous and insoluble modification, and of white into red phosphorus, may be cited as instances of the physical changes brought about by solar influence; the combination of hydrogen and chlorine is sufficiently familiar as an example of chemical change, whilst the coloration which is characteristic of the decomposition of iodo-compounds is due in part to chemical metamorphosis and in part to physical disturbance.

As iron occupies a prominent position in the remedial *impedimenta* of the medical man, and many of its compounds are remarkable for their extreme sensitiveness to light, it forms a convenient centre for the observation of similarly affected substances. Ferric salts in the presence of reducing agents lose some of their oxygen or other negative radical, and if any substance capable of absorbing the negative radical when eliminated be also present, the decomposition is accelerated. Alcohol is such a reducing agent, and the products of oxidation, aldehyd and acetic acid, increase *pari passu* with the reduction of the ferric compound.

The reactions are much more vigorous and the results more pronounced when free exposure to light is insured, results which were demonstrated some years ago by Mr. Schacht in the case of a mixture which contained glycerine and tincture of perchloride of iron.

As organic compounds are, according to the general rule, more readily oxidized than their inorganic analogues, so to speak, it may be inferred that the organic derivatives of iron prove no exception to the rule; indeed, so regular is the decomposition under appropriate conditions that the oxalate and ammonio-citrate may be used for estimating the intensity of light.

The behaviour of the salts of silver is well known; but I refrain from making in a short paper any observations on a branch of my subject which in itself has assisted in laying the foundations of a science, has served to promote the progress of art, and has proved a healthy and harmless source of recreation to thousands of individuals.

Mercurial combinations are only a degree less actively influenced than their argentic relatives.

An aqueous solution of the bichloride, when exposed to the direct rays of the sun, precipitates calomel and evolves oxygen, and just as in the case of the iron salts a body capable of absorbing oxygen facilitates the decomposition, so here the same train of circumstances involves the same effects, and consequently the addition of tartaric acid to a solution of mercuric chloride, which came under my notice recently, was not in accordance with the canons of science from our present point of view.

The oxides of mercury are other compounds of that element which require careful preservation, and so do the iodides; mercurous oxide has an ill knack of changing into the higher oxide and the metal, and the unstable nature of the lower iodide served to help it out of the present Pharmacopæia.

Lead is not a metal whose compounds are very readily decomposed. Nevertheless if the moist iodide be freely exposed to air and sunlight, free iodine is soon developed and a mixture of oxide and carbonate of the metal remains.

The lower chloride of copper becomes changed from a pale coloured composition to a dirty violet or brownish black, resembling silver chloride somewhat.

Even the salts of gold and platinum are readily reduced.

Uranium compounds exhibit the same phenomenon, but they are of minor interest to the pharmacist.

The brownish colour which appears in long kept and slightly damp iodide of potassium is partly due to the action of sunlight, and ammonium iodide is even more susceptible to its influence.

Nitric acid, according to Seebeck, is decomposed by sunlight into oxygen and nitrous acid and is simultaneously coloured yellow.

The reddish discoloration of slightly impure carbolic acid is most easily produced in a light situation; the greenish colour which is seen in long stored decoction of aloes; the greenish tint assumed by both the tincture and the gum of guaiacum and the

yellowish shade which often characterises santonin are all due to the same disturbing influence.

The foregoing examples do not include every instance of photo-chemical action which may present itself, but the connection between cause and effect may be readily traced from a closer interrogation of such phenomena as have been touched upon.

White light, as we all know, is not simple in its nature: it is the effect produced by the overlapping of a ribbon or band of colours, and by means of a prism a beam of white light may be revolved into its primitive constituents; red, orange, yellow, green, blue, indigo and violet rays.

The rays at the violet end of the spectrum are described in the language of the physicist as being more refrangible than the blue, green or yellow, and the red rays are the least refrangible.

The more refrangible rays, a group which includes rays that are not ordinarily visible, but which may be brought into line by the so-called fluorescent bodies, æsculin, quinine, etc., are sometimes characterized as photographic rays, and again they are described as chemical rays, a term which conveys the impression that they alone of all the rays composing the spectrum act chemically.

But their chemical action does not depend upon any special chemical or actinic property inherent in them and absent from the less refrangible parts of the spectrum; it is due rather to the circumstance that all easily decomposable compounds possess the power of absorbing the more refrangible rays. The compound acts as a trap which catches the more refrangible rays and allows the less refrangible to pass or become reflected; as a consequence the stopped rays have their arrested motion transformed into chemical action.

Every coloured ray has its own degree of potentiality, and Herschel said that the colours of flowers bleach most rapidly in those colours which are complementary to them; the red and yellow of the spectrum bleaches the blue of the violet petals, and the deep red shade of the poppy fades more easily under a blue glass than in white light, whilst all the rays from green to violet pale the yellow stain of saffron.

It may seem strange that many simple shades should prove more active than clear white light; but the explanation appears I think in the restraining influence which certain parts of the spectrum exert over others, when combined to yield white light.

Great as may be the influence of light in bringing about chemical change, it is highly probable that more is laid to its charge in this respect than a careful examination of the facts would justify.

There is little doubt that in many instances the traces of moisture and the presence of atmospheric air are indispensable links in the endless chain of decomposition.

I know of no experiments which have had for their object the avowed intention of demonstrating the necessary part which the above factors play, but such an investigation would well repay the one who has the means, the skill, and the patience to undertake it.

Pharmacists know how much more rapidly the discoloration of certain liquors and syrups of iron proceeds in bottles which are partly emptied, as compared with well-filled and tightly corked samples. Again, guaiacum does not become green unless it is in contact with air; hence, the disturbing influence of atmospheric oxygen is of the highest importance in such cases, surpassing perhaps that of light itself.

Still another factor must be considered, that of temperature. In many respects light and heat resemble each other; there is, however, one great difference between them: heat is capable of fulfilling the double office of decomposition and recombination; light, except in one instance, acts as a decomposing agent only.

The exception must be mentioned, for it has to do with the elaboration of complex molecules in the growth of plants which only goes on in the presence of sunlight.

That a certain elevation of temperature is necessary was proved by Amato, who found that a mixture of hydrogen and chlorine, when cooled to—12°, could be exposed to the sun's rays for hours without any combination taking place.

Exposure to warmth and light facilitates the decomposition of volatile oils; hence the necessity for preserving them in a cool, dark place.

A field is still open for an inquiry as to what coloured bottles are best suited for the preservation of many liquid and solid substances which we are obliged to keep, and a brief dip into the subject convinces me that there is much room for improvement.

Whether by accident or design a number of the bottles which we receive from abroad, the amber-tinted glass ones, are admirably suited for the protection they afford to their contents, and I am sure that the old-fashioned blue bottle is at times just the one that ought not to be employed.

The importance of the subject of photo-chemical action has not been overlooked by the pharmacists of a past generation, and though the means by which they arrived at their conclusions may not compare very favourably with the refinements of modern science, they were at least the outcome of two reliable witnesses, common sense and experience.

Mr. Ellwood said the more the behaviour of drugs and chemicals was studied the more pressing became the necessity to consider the influence of light in attempting to explain observed phenomena. Respecting the decomposition of potassium iodide, it had been established that the presence of carbon dioxide hastened the process, and was probably essential. He did not think the difference in colour which santonin underwent was to be attributed to light. He mentioned that rhubarb, aloes and bismuth preparations were all liable to be affected.

Mr. Philp, in referring to the example given by Mr. Williams of the decomposition of a solution of mercuric chloride with tartaric acid, mentioned that some time ago tartaric acid was recommended for addition to solutions of mercuric chloride for surgical dressings, the advantage claimed being that the precipitation of albumen was avoided and consequently absorption was not retarded; recently it has been stated, however, that these solutions were rendered useless by the reduction of the mercuric chloride to calomel.

Mr. Stark thought the Association was indebted to Mr. Williams for his able *résumé*. Little or nothing was known definitely of the action of light in producing photographic prints. It was by no means settled whether the colours were due to metallic silver or to various degrees of oxidation. The instability of most silver prints seemed to point to the latter view. He was unable to agree with the President in his statement that light was not the cause of santonin turning yellow. His own experiment pointed to an opposite conclusion. He thought that the action of light as a combining agent was as powerful almost as a decomposing agent. The formation of phosgene gas was an instance of this, for chlorine and carbon monoxide placed in sunlight quietly united to form $COCl_2$, and there were many other instances.

Mr. Richards said pharmacists were indebted to photographers for the elucidation of many points respecting light and its influences, and he alluded to a paper read some years ago before the British Pharmaceutical Conference by the late Mr. John Williams.

Mr. Mason said he could confirm from actual experience the suggestion that Mr. Williams had made that blue bottles did not protect their contents. In

the bleaching of oils it might be thought that a white glass bottle would effect the desired object most readily, but as a matter of fact the dark blue Winchesters were infinitely superior for the purpose.

Mr. G. Roe said santonin was undoubtedly decomposed by light, and mentioned some anomalous reactions that he had observed in bismuth compounds.

Mr. Williams, in reply, said it was a commonly accepted fact that santonin did undergo decomposition when exposed to light, and the product photo-santonin differed in several important particulars from santonin which had not been exposed. It had been suggested that the appearance of free iodine in a decomposing sample of potassium iodide might be due to the temporary formation and speedy breaking up of potassium triodide KI_3. He was glad to find that his theoretical deductions had been practically confirmed by the observations of Messrs. Philp and Mason. Whilst acknowledging a certain degree of indebtedness to the followers of photography, he thought they could not claim credit for all the work that had been done in connection with the subject, and remarked that very great uncertainty existed as to the composition of the silver film which formed in the photographic process, though recent work pointed to the conclusion that it was an oxy-salt rather than the sub-chloride, bromide or iodide of which they had heard so much. The remark upon the want of combining effects in light was not his own, but he believed it was primarily a question of temperature.

In the absence of the author this paper was read by Mr. A. C. Stark :—

Fertilization of Cypripedium Calceolus.

BY WM. BAXTER, JUNR.

Opportunities having been given me of observing a fine half-wild growth of the above plant in my neighbourhood during the past two years, a note of results might be interesting, I thought.

As to the growth of one plant last April. From the first appearance of the bud above ground it looked remarkably healthy. In seven days it had grown 2 inches, in another seven days it was $4\frac{1}{2}$ inches high, and the leaves were opening out. On the 21st day it was 7 inches high with leaves fully developed and flower bud visible. On the 28th day it was $8\frac{1}{2}$ inches high, and on the 35th day the plant seemed to be fully developed and had grown to the height of $11\frac{3}{4}$ inches, this last rapid growth occurring during very favourable weather. The flower was now half open, and after coming to perfection lasted about three weeks.

The fertilization of this orchid, like some others of the same order, such as *Epipactis latifolia*, *Cephalanthera grandiflora*, and the Listeras, is highly interesting and somewhat complicated, and after careful observation in the matter one has to come to the conclusion that this, like *Epipactis latifolia* and others, to make up for imperfect fertilization has the power of reproducing itself in a more certain manner, viz., by increase of the root, for it certainly does increase rapidly when in favourable situations, even in Britain.

That the plant is entirely reproduced by insect agencies, as was inferred by Darwin and others, is very unlikely, for the difficulty of escape experienced by an insect that visits the flower, and also the fact that it is only those insects that encounter great difficulty that can remove the pollen—these points make it plain that fertilization by insects will not account for its increase, for although Darwin has beautifully described the entrance and exit of an insect to this flower, yet that same insect though traced has not been seen to enter the same plant or another. It takes for its motto "Once bit, twice shy." It remembers its struggles to get out and naturally avoids the plant.

Most of you are doubtless familiar with the flower, which has a large labellum, whose edges are incurved on its upper surface, forming an orifice, and a tempting one to insects. This gives it the appearance of a slipper, and hence its common name, lady's-slipper, or as the Latin name implies, Venus's slipper. Now what takes place when a small bee enters the labellum, which is partly closed by the stigma? The bee enters easily, but the inflected edges of the labellum prevent it from returning that way unless it is a smallish insect; but in that case it would have taken no pollen with it wherewith to impregnate the stigma, for it would have been nowhere near the pollen. No; after vain efforts to return the same way the moderate sized bee very naturally turns his attention to other chances of egress, and this is generally found by one of the two small elastic orifices close to the anthers, and in escaping it must inevitably carry off some of the glutinous pollen (for in this genus the pollen grains are not in dry masses as is usual, but are coated all over with a viscid fluid).

This being done it is evident that unless that insect revisits the same flower or another the stigma cannot be fertilized. Deaths in the labellum are numerous, consisting of insects of too large a size to escape by the anther orifices and unable to crawl up the sides of the labellum, which are covered by reversed hairs, or else by small insects which are held with a tight grip by the very sticky pollen. There is no nectar, and hence it would seem as if the motive for a visit was curiosity, emphasized, my pharmaceutical tutor used to say, by the fact that all the corpses were of the female sex, but I fancy this was one of his regular little jokes to tickle up the interest of a class of students.

Insects experiencing the above difficulty and escaping generally very quickly desert the locality in which the plants grow.

That cross fertilization takes place is extremely improbable, owing to the above remembrance of prison life by the insect, and there seems to be no record of anyone having seen an insect *visit* a cypripedium *having pollen* attached to its back. When small insects up to the size of a little ant crawl right through the labellum and out at the anther orifices, they do not take the pollen off at all, for the distance between the part of the labellum on which they tread and the pollen masses is too great, being $\frac{1}{8}$ to $\frac{3}{16}$ of an inch.

Small bees and certain wasps are of the size to remove the pollen grains, but if you place one of such in the labellum and watch you will find that although they generally escape besmeared in pollen by the anther orifices, yet the insect will have gone through such a laborious work that it seems hard to believe that any insect would enter such a trap again. The plant spreads rapidly on the continent, and it seems as if it must be able to reproduce itself by the roots.

Cephalanthera grandiflora is fertilized in the bud state by the pollen grain emitting tubes into the stigma; but construction makes this unlikely in the case of *Cypripedium*.

The fertilization of orchids is a very engrossing study, but it is not always easy to get the time, specimens or opportunity to carefully watch events.

There was no discussion on the above on account of the lateness of the hour, and for the same reason the following paper was taken as read :—

Notes of a Botanical Ramble in Cornwall and Scilly (July–August, 1889).

BY WILLIAM BAXTER, JUNR.

Though from previous visits well acquainted with the grand coast-line of Cornwall, with its interesting birds and minerals, caves, submarine cables, and lighthouses, I had not until this year penetrated far into its interior, containing as it does vast moors and elevated bog-lands, which from their dreary look do

not attract the tourist, but which would well repay the true botanist to visit.

I do not here mean to particularize the habitats of some of the rarities, the botanist with any enthusiasm at all will find the plants easily enough, and will take only what he really wants and is proper. For showing me the habitat of many plants I am indebted to two naturalists, with one of whom I had long corresponded, but had not seen till this year. The other one, Francis Jose, a serpentine worker of Lizard Town, would, provided he felt confident of your being a true botanist, take you to the haunts of some rarities, and being also intimately acquainted with the geology and mineralogy of the Lizard district he becomes a very interesting companion to those, like myself, engaged in such studies. The insulated position of Cornwall, and the prevailing and terrific "sou' westers" produce a stunted vegetation, and hence the botanist is concerned on the outset with comparatively low-growing plants, and the air being moist bog-plants especially thrive there in a manner which must be seen to be believed. Occasionally, my two naturalist correspondents used to send me up quite large quantities of rare plants, and on remonstrating with them for their reckless gathering they used to laugh at me in words, and say that there were thousands and thousands of the same; that they grew very often in spots that were probably not visited by six people in the year, and that a little thinning did them good. This year I was able to see the truth of their remarks, and be quite sure that the plants would not suffer from their hands. The Lizard peninsula is especially rich in plants of Leguminosæ. Over forty species inhabit the district south of Helston and the Helford river, and the greatest quantity coincides with the outcrop of the beautiful serpentine rock, and over the same area the magnificent Cornish heath with its varieties is to be seen in perfection. Of the Leguminous plants the following are of note, *Genista tinctoria*, var. *humifusa*, is found in Kynance and *G. pilosa* near Lizard Town, all but one species of Lotus, *Ornithopus perpusillus* (common bird's foot), seven of the Vicia, including *V. Orobus*, *tetrasperma*, and *lutea*; but it is in Trifoliums that this district is so specially rich. I saw seventeen species within a radius of half-a-mile, including the following in abundance: *T. subterraneum*, *T. Molinenii*, *T. strictum* and the double-headed *T. Bocconi*, also *Trigonella ornithopodioides* (the bird's foot trigonel). In the same district too I found abundance of the wild asparagus, for although every bit has been ruthlessly torn from Asparagus Island in Kynance Cove, yet I know where it grows in plenty, but he who obtains it will have qualified for election to the Alpine Club. I think the plant is tolerably safe in its present home. I was given to understand that it never berries in Cornwall. The rare *Allium Sphærocephalum* is to be found near Kynance, also two *Charæ baltica* and *fragifferum*. The juniper, rupture-wort, *Scilla autumnalis* also were come across, two immense plants of the former and abundance of both the latter.

Along the coast you find the beautiful carline thistle, the only yellow-bloomed one; the still finer sea holly, which is covered entirely with a glaucous or bluish-white bloom, and whose roots are made into a kind of sweatmeat, "candied eryngo-root;" *Polygonum Raii*, *Ruffia maritima*, *Potamageton pusillus*, *Hyoscyamus niger*, and many others.

Cornwall is remarkably rich in minute flowering plants, amongst which are *Sibthorpia Europæa*, *Campanula hederaceæ*, *Anagallis tenella* (the beautiful bog-pimpernel), *Centunculus minimus*, *Radiola millegrana*, *Illecebrum verticillatum*, which is very handsome, in large patches.

Juncus pygmeus is abundant here, which is its only habitat in Great Britain. *J. capitatus*, too, which was discovered here in 1872, is as plentiful. *Pinguicula lusitanica* is very common; also *P. vulgaris* and its var. *grandiflora*, which is generally stated only to be found in the south-west of Ireland; but as it seems to be located throughout the extreme west points of Europe, it is not surprising it is found in Cornwall.

Ferns are very abundant, especially the filmy (Wilsoni), *Asplenium lanceolatum* and *Marinium*, also *Ruta-Muraria* and *Ceterach*. *Osmundas* can be gathered of sizes ranging from 2 to 3 inches to 6 to 8 feet high, and happily they are too abundant and often inaccessible to be easily exterminated. The flora is undoubtedly a rich one. At Penzance two or three kinds of algæ are collected, principally *Porphyria lacinata* and *Ulva latisima*, which are sent to Swansea and London, where it is made into what is known as "laver bread," or eaten pickled in salt, and sometimes stewed and eaten with pepper, butter, lemon-juice, or vinegar, leeks and onions.

I am giving some attention to this, and if anyone present knows the exact process adopted in Swansea and Cardiff I should be glad to hear. To form an idea of what economic uses certain algæ can be put to, let me commend you to the report of the researches of Mr. Stanford, as published in *Pharmaceuticnl Journal* and elsewhere. A visit to the Scilly Isles cannot but interest a botanist, as the gardens of Tresco Abbey contain a splendid collection of subtropical plants all growing out in the open. There are hundreds of the American aloes, and I was fortunate to see twenty-five or so in bloom and as many feet high, and about 12 feet across. They take about twenty-five to thirty years before they bloom, the exhaustive process being a fatal one.

They ripen the best grapes and tomatoes under glass but without artificial heat. The African *Mesembryanthemum edule* over runs the rockwork, and in July the place is one blaze with scarlet *Crassula coccinea*. Hedges are mostly composed of *Escallonia macrantha*, a fine red blossoming dense shrub. Tree ferns grow out in the open, such as *Dicksonia antartica*, 25 feet; *Alsophila Rebeccæ*, 6 feet; *Cyathea dealbata*, 8 to 10 feet; *Lomaria Magellanica*, *Aspl. Nidus avis*, 2½ to 3 feet. Of palms you have *Corypha australis*, very high, *Chæmarops humilis*, 15 feet, *Taxodium sinense* and *Podocarpus andina* (Chili); acacias, wattles and aloes, bamboos and Cape bulbs (*Sparaxis Ixias*, etc.) are there in abundance. Of forest trees there are fine specimens of *Metrosideros robustus*, the Australian iron-bark tree, which has magnificent red terminal blooms, so that the top of the tree seems to be all a-flame, and hence it is called "the blazing bush." It is 35 to 40 feet high though. Other trees are *Picea nobilis*, *Pinus insignus* and *Cupressus macrocarpa*, 3 feet, and *C. lambertina*, 50 feet. Camellia trees are 25 to 30 feet high, and the largest specimen of *Eucalyptus globulus* in Europe I think is to be seen there. It is 60 feet high and 9 feet 6 inches in girth.

Other interesting plants are the Australian musk and prickly pear of the West Indies, cinnamon tree, *Tasmania aromatica*, which berries and ripens, and which is better known as the winter pepper-bush.

Berberis Darwinii with its familiar orange blossoms is 10 feet high. Magnolias, figs and myrtles grow to a great size. They cannot, however, grow roses.

They breed ostriches successfully, and there is plenty of fishing and shooting. The inhabitants grow immense quantities of gladioli, 30 to 40 acres I saw, and narcissi for the London, Birmingham and Manchester markets.

If you go to Scilly, stay two or three days, a shorter stay will only disappoint. The inevitable rough passage deters most people, but to good sailors the trip is a very enjoyable one. On the mainland there is capital fishing and shooting, and the novel sport of seal hunting at Gwithian, near St. Ives. Many sea birds, I am sorry to say, are ruthlessly destroyed, and the Cornish chough is almost extinct.

In the magnificent caves around the coast are to be found some very fine medusæ, starfish, molluscs and echinoderms. The holiday can be made as economical as you like, and I strongly recommend it to you.

The attention of the members was called by Mr. Richards to a fine specimen of caffeine tri-iodide kindly lent by Messrs. Hopkin and Williams. Some models of antiseptic nail brushes, recommended for medical men and hospital use; some cocaine masses of a peculiar shape, intended for obstetric use, and a simple bandage roller, were forwarded for exhibition by Messrs. Reynolds and Branson, Leeds.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, November 14, Mr. Joseph Ince, F.L.S., F.C.S., in the chair. The officers for the new session were elected, Messrs. A. O. Scrivener and A. Gunn acting as Scrutineers. They reported the result to be as follows:—Vice-Presidents, Messrs. Edmund White and Lewis Ough; Secretary and Treasurer, Mr. F. W. Short; Assistant Secretary, Mr. H. D. Fuge; other members of Executive Committee, Messrs. H. W. K. Pears, J. C. Umney, E. H. Cranstone and J. P. Barnes.

An introductory address was then delivered by Professor Green, M.A., B.Sc., F.L.S., who dealt chiefly with the most advantageous methods of study. After first referring to the objects of study, he explained the way to make the best use of the various means provided, such as lectures, text-books, etc., and concluded with advice on the subject of notes.

At the conclusion of the address a vote of thanks to Professor Green was proposed by the Chairman, seconded by Mr. Wyatt, and heartily endorsed by the meeting.

The thanks of the meeting have been also rendered to Mr. Ince for presiding, the meeting adjourned.

Provincial Transactions.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

A meeting of the Manchester Pharmaceutical Association was held on Wednesday, November 13, at the rooms of the Chemical Club, Victoria Hotel, Mr. F. Baden Benger in the chair. Before commencing the ordinary business it was unanimously resolved to send a vote of condolence to the family of the late Mr. Harold Woolley. The Committee appointed at the last meeting to consider the question of holding a social gathering recommended that the gathering should take the form of a smoking concert, to be held at the Grand Hotel on the night of November 26, invitations to be sent to every registered member of the trade in the district, whether members of the Association or not.

The committee's report and recommendation were adopted.

Mr. W. Elborne then read a paper on "Galenical Pharmacy." Pharmacy, he said, might be divided into three branches, chemical pharmacy, galenical pharmacy, and dispensing. The practice of retail pharmacy at present embraced chiefly galenical pharmacy and dispensing. Having briefly described the objects of the first group, Mr. Elborne proceeded to say that galenical pharmacy had for its scope the preparation of all medicinal and pharmacopœial preparations, together with the processes involved, the products being not of a definite chemical composition, but mixtures of active and inert principles. An attempt had recently been made to standardize the most potent of these products as regards the active principle they contain. Dispensing was the art of compounding medicines prescribed for the immediate use of the patient. Mr. Elborne divided the operations of galenical pharmacy into three groups, viz.:—(1) the mechanical disintegration and comminution of air-dry vegetable substances; (2) the disintegration and expression of fresh vegetable substances; and (3) the extraction of air-dry vegetable substances by means of solvents. Under these groups the essayist described the different methods and apparatus employed, and in the course of his remarks on group 3 he pointed out that vegetable products, being generally of a very heterogeneous composition, were only partially soluble in the various menstrua generally used in their extraction. He mentioned the principal menstrua (spirit, water, acetic acid and ether) and their applications. Principles which were soluble in one menstruum might not be soluble in others: for instance, although gums were insoluble in alcohol, yet a certain proportion of rectified spirit might be added to an aqueous solution of gum or vegetable albumen without entirely precipitating it, and, *vice versâ*, a certain proportion of water might be added to alcoholic solutions of resins and oils without rendering them turbid. Upon this account diluted alcohol (proof spirit), as yielding a more representative preparation, was an important menstruum in the extraction of many of the Pharmacopœial vegetable substances. Tinctures prepared with rectified spirit generally assumed a milky appearance on the addition of water, owing to the resinous substances being precipitated, upon which account, when prescribed in mixtures, mucilage of acacia was frequently ordered in conjunction with them for their suspension. Proof spirit tinctures, on the other hand, generally remained clear when mixed with water.

The following note was then read on—

TINCTURES AND THEIR SPECIFIC GRAVITIES.

BY J. C. HUSBAND.

There is a matter which I think should be brought to the notice of this meeting, and, indeed, to the notice of chemists generally.

I refer to a paper published in the *Analyst* of this month upon "Tinctures, their Specific Gravity and Extractive Matters." This is written by Mr. J. Spilsbury, a Fellow of the Chemical Society and a pharmaceutical chemist. Yet the errors are so apparent and could so easily have been prevented that one wonders it should have been published by a scientific man in a scientific journal.

In the first place he says that "The following summary of averages is based on estimations extending over a period of ten years." The tinctures were made under his personal supervision, and strictly in conformity with the formulæ of the British Pharmacopœia.

We have no time to go over the list *seriatim*; let us, however, try one or two of these ten years' averages. Take for instance tincture of stramonium, sp. gr. ·939, and tincture of opium, ·936.

Though tincture of stramonium contains only about one-tenth of the amount of extractive which we find in tinct. opii, yet the former is ·003 heavier.

Looking at the list we find for serpentary—made with proof spirit of ·920 gravity—comes out ·911, and that for lemon, which is also made with proof spirit, and which, moreover, contains nearly 9 per cent. of extractive matter, comes out ·893.

Are we to take those figures as the average of ten years' experience?

Another matter, and the most serious one, is that the "official" tincture of sumbul, "made strictly in conformity with the formula of British Pharmacopœia,"

should be of a sp. gr. of ·931; the same with tincture of cinnamon, whose gravity is ·828. It is now over four years since we got a new B.P., since the menstruum of these two tinctures was altered from proof spirit to rectified, and yet we have these old preparations brought out as official tinctures and the new ones completely ignored.

I have only brought forward this paper so that we may keep our eyes open and see that these figures do not creep into the pharmaceutical papers and be quoted for more than they are worth.

MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

A meeting of this Association was held on Tuesday night at the Mason College, Mr. A. Southall presiding.

The following notes were read:—

Note on Cajuput Oil.

BY R. A. CRIPPS.

Some time ago my attention was drawn to a sample of lin. crotonis which did not form a clear solution, but consisted of two layers, the upper and larger one being thin and limpid, the lower one oily. When warmed the liquid became homogeneous, but again separated into two layers on cooling. The cause was evidently not due to the croton oil, the same sample having on former occasions given a clear liniment; the spirit used was of B.P. strength; it was therefore clear that the cajuput oil was at fault. I therefore examined the oil and found its sp. gr. to be ·913. This being so much below that of any sample I had previously examined, I concluded that the oil was either adulterated or that the distillers of cajuput oil are in the habit of collecting the distillate in fractions, without subsequently mixing them, this being one of the earlier fractions. I have therefore examined a number of samples in the original bottles (old wine or spirit bottles) with the following results:—

(*a*)	2	samples of sp. gr.	·926
(*b*)	2	,, ,,	·9255
(*c*)	7	,, ,,	·925
(*d*)	11	,, ,,	·9245
(*e*)	28	,, ,,	·924
(*f*)	15	,, ,,	·9235
(*g*)	13	,, ,,	·923
(*h*)	2	,, ,,	·9225
(*i*)	9	,, ,,	·922
(*j*)	2	,, ,,	·921
(*k*)	2	,, ,,	·920
(*l*)	1	sample of sp. gr.	·913
(*m*)	1	,, ,,	·8945

Average of 95 samples of cajuput oil, ·9232.

Average of 93 samples of cajuput oil, excluding last two samples, ·9236.

The colour of the samples varied from pale brownish yellow to bluish green, the colour bearing no relation to the specific gravity. With the exception of the sample of sp. gr. ·913 all these oils came in four separate consignments, the members of each consignment varying in sp. gr. to the extent of from 3 to 7 in the third decimal place, not counting the last anomalous sample, although 85 out of the 95 samples ranged from ·922 to ·925. I think therefore we may consider it proved that the mixing of various fractions or batches of oil is performed very imperfectly or not at all. The anomalous sample "m" possessed a slightly peculiar odour, was of a pale bluish green colour, and failed to make a satisfactory croton liniment. I have not yet been able to further examine this oil, but intend submitting it to fractional distillation at an early date.

I may mention that it is important that the sp. gr. of cajuput oil be taken at exactly 15·5° C., in consequence of the high expansion equivalent of the oil (which I have found to be ·0009 for each degree centigrade between 13° C. and 23° C.) unless this equivalent be borne in mind.

In consequence of these results, together with the sp. gr. given by Mr. West (*Pharm. Journ.*, xix., p. 235), I should suggest that the Pharmacopœia contain amongst the tests of cajuput oil "sp. gr. from 922 to 926 at 15·5° C."

Oil of Rosemary.

BY R. A. CRIPPS.

In a recent number of the *Pharmaceutical Journal* attention has been drawn to the use of petroleum as an adulterant of cassia oil. There is very little doubt that this substance is largely used for the purpose of sophisticating essential oils, but I have not seen any published notice of its use in the case of oil of rosemary. Quite lately I have had occasion to examine five samples of this oil, four of which proved to be adulterated, two with petroleum and two with alcohol. The quantity of each at my disposal was very small, or I could have made a more extended examination of them. I need scarcely remind you that the petroleum used consists necessarily of the heavier portions, consequently it may be detected, and approximately estimated, by exposing the oil to the heat of a water bath in an open dish until the odour of rosemary is practically lost, the residue consisting of petroleum and a slight resinous portion which is always left by the oil. Alcohol may be detected by agitating the oil with a particle of magenta; if pure no colour is imparted to the oil, but if adulterated the dye dissolves, the colour being deeper the greater the quantity of alcohol present.

Having detected these impurities as mentioned, I took the solubility of each oil in rectified spirit, ·838.

1.	Pure oil	1 in 5
2.	Adulterated oil (petroleum) .	about 1 in 20
3.	,, ,, ,, ,,	1 in 30
4.	,, ,, (alcohol)	1 in 4½
5.	,, ,, ,,	1 in 3½

Sample No. 2 was distinctly fluorescent, and both 2 and 3 were of full yellow colour.

A short discussion followed, and a vote of thanks was passed to Mr. Cripps for his paper.

Mr. Liverseege then demonstrated a method of ascertaining the amount of carbonic acid in the atmosphere, and the meeting terminated.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second meeting of the twelfth session was held in the Pharmaceutical Society's House, 36, York Place, on Wednesday, November 13, at 9·15 p.m. Mr. A. Russell Bennet, President, in the chair.

The minutes of last meeting having been read and approved the evening was devoted to the reading and discussing of notes arranged by Mr. George Coull, B.Sc. The first was a—

Note on Aqua Destillata.

BY GEORGE COULL, B.SC.

In the new edition of the British Pharmacopœia, two new tests are given for the purity of distilled water. "It is not affected by . . . . . or a mixture of starch mucilage and oxide of potassium. It gives only a faint yellow coloration when a solution of potassio-mercuric iodide is added to three or four ounces."

The latter test is Nessler's well-known test for ammonia, the former is presumably a test for nitrites which it entirely fails to detect.

You might have water loaded with nitrites which

would escape your notice unless you completed the test by adding a few drops of acetic or a dilute mineral acid.

The acid is required for the purpose of setting free both the hydriodic acid and the nitrous acid. It is by the reduction of the nitrous acid to nitric oxide and consequent oxidation of the hydriodic acid that we get free iodine.

$$KNO_2 + HC_2H_3O_2 = KC_2H_3O_2 + HNO_2$$
$$KI + HC_2H_3O_2 = KC_2H_3O_2 + HI$$
$$2HNO_2 + 2HI = 2H_2O + 2NO + I_2.$$

The iodide must be free from iodate or the blue colour is produced with starch mucilage and a dilute acid, although nitrites are absent.

The test should read:—"It is not affected by . . . . or a mixture of starch mucilage and iodide of potassium, to which a few drops of acetic acid have been added."

The next communication was a—

Note on Aqua Destillata.

By J. Rutherford Hill.

Recently I had brought under my notice a sample of distilled water which gave a very distinct acid reaction with litmus. Assuming that it probably contained carbonic acid which would be removed by heat, a little of the sample was boiled, but still it gave a very decided acid reaction. No mineral acid could be detected, and thinking it might contain some organic acid, such as acetic, a little was distilled, but the distillate was perfectly neutral. On adding a little solution of lime to a portion of the sample a distinct deposit of calcium carbonate separated after standing a short time. It would appear therefore that the acid was carbonic acid and that it could not be entirely removed by boiling. On passing a current of carbonic acid gas through some neutral distilled water containing litmus it very soon became acid, and I found that the blue colour of the litmus could not be restored by boiling. I speak from memory but I am not aware that this fact has been noted before.

I had the curiosity to try how the sample would answer to the other official tests. It gave no reaction with any of them. A current of sulphuretted hydrogen was passed through about ten ounces of the water for upwards of fifteen minutes but not the slightest coloration took place even after standing several hours. On adding a little ammonia, however, the liquid at once became a greenish-black, and after standing several days a distinct black precipitate has separated. A further portion of the sample tested with potassium ferrocyanide gave a distinct blue reaction. There is no doubt that the sample was contaminated with iron, and this would have entirely escaped detection had the official tests alone been relied on. I would therefore suggest that the official test, "It is not affected by sulphuretted hydrogen," should be amended and read, "It is not affected by sulphuretted hydrogen either alone or after the addition of ammonia."

As to the source of the iron I think it is very likely to have been derived from the iron pipes through which the steam was probably conveyed, and as it is not uncommon to obtain distilled water by condensing the waste steam from steam boilers, this impurity is one very likely to be met with.

Mr. Coull then gave a sketch of Van't Hoff's theory, showing how it explained cases of physical isomerism, which had puzzled chemists for a long time. He took the two varieties of ethylidene lactic acid, and fumaric and maleic acids as examples. This was illustrated by means of models and black-board demonstrations.

Mr. Coull exhibited specimens of the two new hypnotics, chloralamide and tetronal, and made a few remarks on their constitution and action.

The reading of the notes was followed by a discussion, taken part in by Messrs Coull, Duncan, Dougall, Henry, Hill, W. L. Howie, Lunan and McEwan, and on the motion of the Chairman a cordial vote of thanks was awarded to the authors of papers.

The Chairman having intimated that the next meeting would take place on Wednesday, 27th inst., when a paper on "Our Vegetable Extracts," by Peter MacEwan, F.C.S., will be read, the meeting was closed.

ABERDEEN CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second meeting of the session was held on Friday evening, November 15, in the Silver Street Hall. There was a very large attendance, the business of the evening being the reading of the magazine papers. Four papers were read and gave rise to a good discussion.

At the end of the meeting a proposal was made to start a Materia Medica and Pharmacy Class, which was favourably received, but owing to the lateness of the hour no definite arrangements were made and had to be deferred for further consideration.

The next meeting will be held in the Music Hall Buildings, when Mr. W. L. Howie will give an account of a "Ten Days' Visit to the Hardanger," illustrated with ninety dissolving views taken by the lecturer.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The third meeting of the session was held on Thursday, October 31, when a paper was read by Mr. J. R. Johnson on "The Influence of Light upon the Growth of Plants," and Mr. G. E. Grattan contributed some "Notes on Dispensing." A paper was to have been read by Mr. Wyatt, but owing to the lateness of the hour when it was reached it was decided to postpone it until December 12.

Mr. Grattan, in the course of his notes, referred to the old rhubarb and soda mixture, and stated that a very satisfactory result is obtained by mixing the rhubarb and soda roughly on paper, putting them into the bottle, adding water to half fill the bottle, and shaking it; this gives rise to considerable frothing, which is easily dispelled by the tr. card. co. or other spirit, which is usually prescribed. A powder which is largely prescribed by a Liverpool physician consists of equal parts of zinc, sulphate and lead acetate, which when mixed in a mortar rapidly deliquesce and form a mass. This may be prevented by powdering separately and mixing quickly on paper, and sending out in a well-corked, wide-mouthed bottle. Mr. Grattan showed a number of pil. pot. permang. coated, made in June last according to formula suggested in the *Pharmaceutical Journal* some time ago. It consisted in mixing a little kaolin with the powdered permanganate and massing with lanoline; the pills were in splendid condition.

Mr. Johnson then read his paper, which gave rise to considerable discussion.

The Influence of Light upon the Growth of Plants.

By J. R. Johnson.

In introducing the subject of the influence of light upon the growth of plants he could not claim any originality or novelty for the subject, since a mere glance at the various text-books showed how much attention had already been bestowed upon it. Still the subject was one of the highest interest, and one which they as members of a students' society might

well make themselves fully acquainted with. There was a great diversity of opinion upon the various actions of light in vegetable processes, and there was still plenty of scope for those who had the inclination and the opportunities for observation. Light was generally regarded as indispensable to plant life, though this applied more to the complex processes of assimilation, etc., in plants which had already obtained to a considerable growth. Roughly, its influence might be considered *positively*, as in the cell processes (such as the development of chlorophyll, starch and plastids, where its influence was indispensable), and negatively, in its retarding effect upon growth, and its effect upon the positions, shapes and developments of plant organs.

The processes in plant life to be attributed to the positive influence of light having been briefly sketched, special attention was directed to its negative effects as a phase of the subject, the importance of which was not generally sufficiently recognized, and many instances were given demonstrating the retarding effect of light upon plant growth. While in the absence of light growth was far more rapid, provided sufficient material was at hand, it was shown that the presence of light ensured stability of structure and the proper fulfilment of transpiration and many minor plant functions. The special manner in which these conditions obtained in fungi and the lower forms of plant life was also dwelt upon, and the paper concluded with noticing some important provisions in plants againt the effects of too great an exposure to light.

The next meeting will be held on Thursday, 28th inst., at 8.30 p.m., in the Society's rooms, and will be of a social character.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The Association met in the rooms, 74, Commercial Street, on Thursday evening, November 14, the Vice-President, Mr. D. Skinner, in the chair. There was a good attendance.

The Chairman, after a few introductory remarks, called on Mr. Frank W. Young, F.C.S., F.R.S.E., to give his lecture on "Fermentation and Putrefaction."

In his opening remarks Mr. Young said it would be quite impossible for him to cover the whole ground of his paper on that evening, but he hoped he might have the pleasure of coming amongst them again and finishing it. He was led to fix on this subject by a consideration of the proneness to putrefy as exhibited in vegetable infusions and such like preparations. The lecturer then went on to explain the chemical relations of the lowlier forms of life associated with these phenomena and those of a higher description.

Mr. Young then detailed the general characteristics of a fungus, showing that it is not unlike the lower forms of animal life. These could be cultivated for study in Pasteur's solution, which contained cane sugar, ammonium tartrate, calcium phosphate, magnesium sulphate, and potassium phosphate. These are the essential elements for fungoid growth. The familiar experiment was exhibited in which the action of 1 or 2 grains of pure yeast were thriving luxuriantly in the culture solution, carbonic acid gas being also freely evolved and passed into lime water. In this action it was stated that 1 or 2 per cent. of the sugar is appropriated by the germs, while the remaining 98 per cent. is decomposed into CO_2, alcohol, glycerine, and succinic acid. Some vigorous yeast cells were exhibited under the microscope.

Mr. Young emphasized the desirability of keeping in view the fact of the actual *life* of these cells. He then proceeded to state that fermentation was practically life with a deficiency of oxygen. It was developed from germs which were either found on the outside of such fruits as grapes, gooseberries and the like, where the process of expression rendered certain that the juice came in contact with the fermentive germs, or it was produced artificially, as in the case of beer brewing and bread making. These processes were detailed in a very interesting manner.

The first great question which strikes one with regard to putrefaction is, Where do the germs come from? Of course, they come from the air, where they continually float about. They are of excessive minuteness $\frac{1}{10000}$ to $\frac{1}{30000}$ of an inch in diameter, and are much smaller relatively than those of the torula, or ferment germs, which range from $\frac{1}{3000}$ to $\frac{1}{4000}$ of an inch. That they do come from the air was clearly demonstrated by two parts of an infusion of hay, one of which had been heated to about 212° F., and thus sterilized and the neck of the bottle plugged with cotton wool while steam was issuing. In the other bottle, where no such provision had been made, there was to be found a vigorous growth of hay bacilli. The life histories of the various bacteria were detailed in an interesting manner. In the case of the putrefactive germs there was no proof of spontaneous generation. This Mr. Young pointed out was but the result of numerous experiments made by Professor Tyndall. Meat and other organic substances can, as is well known, be preserved by freezing, salting, and the use of antiseptics, while the organisms can be destroyed by boiling and burning. Organized substances were not inherently decomposable, instability was induced by lowly organisms widely diffused through the atmosphere finding a suitable medium. Putrefaction was therefore proved to be a concomitant of life not of death, at the same time these germs were not entirely mischievous in their action. They were shown to exercise a valuable function in oxidizing waste and animal substances, decomposing them with a rapidity only attainable by cremation or actual ignition, the innocuous products, carbonic acid, ammonia and water being formed in the process.

In concluding a most interesting and instructive lecture Mr. Young said he hoped to have the opportunity on some future occasion of taking up some application of biogenitic philosophy to pharmacy, surgery and daily life.

On the motion of the Secretary a very hearty vote of thanks was accorded to Mr. Young for his able lecture. This was cordially supported by the President and Mr. Mair.

Mr. Young was thereafter, along with Mr. J. Rutherford Hill, Edinburgh, elected an Honorary Member of the Association. Mr. Young, having acknowledged the vote of thanks and also thanked them for the honour they had conferred on him, the meeting then broke up.

Parliamentary and Law Proceedings.

The Sale of Antipyrin.

censure of a chemist's assistant.

An inquest of considerable interest to chemists and druggists was held at Stockport on Thursday.

The evidence was to the effect that a domestic servant, 22 years of age, named Leah Butterworth, had on the previous Saturday been seized with pain in the head and went to Needham's (late Proctor's) chemist's shop, Shaw Heath, where the assistant, John William Buckley, gave her four packets of antipyrin, telling her to take the contents of one every hour and a half. She took one packet the same night; next morning she became worse, and died before medical assistance arrived.

Dr. Gordon deposed that he had made a *post-mortem* examination and found death was due to tumour on the brain. He had seen the packets of antipyrin; there were about 12 grains in each.

The Coroner: Do you call 12 grains excessive?

Witness: To give 12 grains without a medical examination is excessive.

The Coroner read from the instructions given by the manufacturers of antipyrin that its use in cases of weak heart should be guarded, and that it was to be taken "under prescription, and under medical care."

Witness, continuing, said it should not be given without an examination of the heart.

The Coroner: Would you administer it yourself unless you had seen the patient first?—No.

It acts upon the heart and lowers the system?—Yes, but it would be all right if the patient had not a weak heart.

As a matter of fact it has had nothing to do with causing death in this case?—I will not say that. I have found sufficient to cause death in the tumour.

A Juror: Ought the chemist to have given instructions with the powder?—Most decidedly.

John William Buckley was then called. Having spoken to the sale of the powders, he was asked by the Coroner:

Have you read the directions of the manufacturer?

Witness: Yes.

Have you read that part in italics?—I did not read it until Dr. Gordon came to me.

You are perfectly aware that the powder affects the heart?—Yes, because I ask people who come to me if they have got a weak heart.

Did you ask this girl if she had got a weak heart?—No.

And yet you told her to take a powder every hour and a half.

Are you aware that that might have had a fatal result if she had had a weak heart?—I do not think from experience that 12 grains would have any effect. The instructions say that 1½ grains can be given to a child for every year old, and under those circumstances the dose I gave was low.

Do you know that the faculty do not prescribe more than ten grains?

Dr. Gordon: That is not so.

Witness: They have prescribed fifteen grains for a dose.

The Coroner: A twelve grain dose might have a serious effect on a weak heart.

Has it had an effect in this case? I am speaking for your own good.—I have been told that that quantity would not affect the heart.

You have no right to administer these powders indiscriminately when you do not know the constitution of the person who buys. The jury wish me to point that out to you, and if you supply this compound again I should advise you not to do so unless you have the authority of a doctor.

In answer to witness, Dr. Gordon said witness ought not to have supplied forty-eight grains without instructions to the patient.

The Coroner (to witness): Are you a qualified chemist?—Yes.

Why did you not write the instructions on the labels?

Witness did not answer.

A Juror: Why did you use Mr. Proctor's name on the labels when he has nothing to do with the shop?—We have labels in the shop, and so long as we are qualified I do not think it matters, and I hope, gentlemen, you do not think that any responsibility rests with me in this matter.

The Coroner: The powders are not the cause of death, and that is all I can say. The jury are of opinion that you ought not to have given deceased so many powders without any instructions, and that forty-eight grains is too much to administer to a person whom you know nothing about.

A Juror: We are of opinion that you are much to blame.—I do not think I should bear any blame for the death.

The Coroner: We do not say you should.

The Coroner then summed up. He said there was no doubt death was due to the tumour, and the powders had nothing to do with it, but Buckley had no right to sell this drug without any instructions or prescription from a doctor. He thought the assistant was highly to blame. Had he read the instructions he would certainly not have sold the powder. The most important part in italics he had never looked at.

A Juror said chemists ought not to place young men in charge of shops.

The Coroner said if the assistants were qualified nothing could be done.

A verdict was returned of "Death from Natural Causes."

Review.

WATTS'S DICTIONARY OF CHEMISTRY. Revised and entirely rewritten. By M. M. PATTINSON MUIR, M.A., and H. FORSTER MORLEY, M.A., D.Sc. In four Volumes. Vols. I. and II.*

The 'Dictionary of Chemistry,' compiled by the late Mr. Watts, and published between 1863 and 1868, has long since become an insufficient representation of the state of chemistry, and the four supplementary volumes published between 1872 and 1881 have not altogether made up for the deficiencies arising from the remarkably rapid progress of chemical science. The want of a complete book of reference has therefore been much felt by chemists, and the announcement that Watts's 'Dictionary' would be revised and rewritten to bring the work up to the present date was gladly welcomed. Two volumes of this work have now been published, dealing with the subject matter up to the end of the article "Indigo." Comparison of the contents with the original 'Dictionary' of Watts shows that very considerable alterations have been made, not only with the object of bringing the several articles up to date but also for the purpose of economizing space. A system of abbreviations has been adopted in the description of physical and chemical characters of substances that is very useful in this respect, and though it is at first sight rather uninviting that objection is soon overcome. Altogether the present work is far less a book for reading than even Watts's 'Dictionary' was, but that is not the use for which a dictionary is chiefly valuable, and in the case of a dictionary of chemistry it is above all important that, as a work of reference, it should be as far as possible a complete register of established data and recorded observations. It is evident that the editors have carefully applied themselves to that task, and in doing so they have rendered a signal service to chemists as well as to those who require to seek information as to particular facts or to refer to the original papers of chemical investigators. The 'Dictionary of Chemistry' is therefore a work that ought to be in the possession of every chemist and of every person who is engaged in conducting operations of an industrial or otherwise technical nature involving acquaintance with chemical science. In this connection it should also be borne in mind that the expense of producing

* London: Longmans, Green and Co. Large 8vo. Vol. I., pp. i.-xx., 1-752; Vol. II. pp. i.-xii., 1-760. 42*s.* per vol.

such a work must necessarily be very great, and that a considerable sale of it is the only means by which the publishers can be adequately compensated for their enterprise in venturing upon its publication.

During the twenty-five years that have elapsed since the publication of Watts's 'Dictionary of Chemistry' commenced, the progress of chemical science has been in every way immense. Not only have multitudes of new facts been discovered, but the theoretical considerations according to which the general mass of knowledge constituting chemistry is now regarded are either entirely new or radically remodelled. The recognition of the intimate connection of chemistry with purely physical science has also led to the application of physical methods of investigation which are of great importance and must necessarily be considered in connection with the results obtained by their means. It is for these various reasons that the system of abbreviation has been adopted in the descriptions of the properties of substances. With the same object formulæ have been substituted for the lengthy words now frequently necessary for expressing chemical constitution, and it has been decided that the treatment of subjects appertaining to technical chemistry should be left untouched. In the original work considerable space was devoted to articles of this kind, which would now more appropriately find a place in a separate book. This limitation of the subject matter appears to be very suitable, and it is indeed to be regretted that this excellent principle has not been carried out even further. Considering the urgent demands for space for the admission of mere data, it might also have been convenient to have transferred all the articles of a theoretical nature to a special volume. When it is remembered how vast an inroad is made upon the 1512 pages of the first two volumes of the 'Dictionary of Chemistry,' by such articles as Affinity, Atomic Weights, Bacteria, Chemical Change, Classification, Crystallization, Dissociation, Equivalency, Explosion, Fermentation, Formulæ and Geology, to mention only some of the longer articles of a theoretical, historical, or general character that might be dealt with as has been suggested, it will be seen that much space could thus have been saved. In the two volumes now published there are no less than about three hundred pages of matter of this kind. Of course it may be said in answer to these suggestions that chemistry does not consist altogether of the dry bones of facts, but that it is the living spirit of theory which connects all those facts together into a harmonious and beautiful whole. For the student it may be and no doubt is to a great extent essential that he should acquire a knowledge of facts through the aid of connecting theories. For that purpose, however, we have abundance of excellent manuals and text books. A Dictionary of Chemistry we regard in a different light. It need not be a complete encyclopedia of the science, but should aim rather at comprising within the smallest bulk that material which is most calculated to be useful for the particular purpose contemplated. It is not a student's book at all, until the student is tolerably advanced, and even then not one to which he would best have recourse for studying theories. The article on Analysis is a further illustration of redundancy; it occupies fifty pages, and valuable as it is in itself there is reason for thinking that analysis might be regarded as being so much a branch of applied chemistry as to warrant the omission of its treatment from the 'Dictionary of Chemistry' quite as much as that of a special metallurgic operation or any other branch of applied chemistry. It is also difficult to understand why three pages should be devoted to such a purely pharmacological subject as cinchona bark, while aconite root and belladonna leaves are unnoticed, though perhaps of greater chemical interest. The article on Hopeine might also have been well spared as belonging to apocryphal chemistry.

The opinion that has been expressed above is further supported by the fact that although the subject matter got through in the two volumes by the alphabetical treatment has advanced as far as the article Indigo, there are many instances in which important substances whose names come earlier in the alphabetical order are mentioned only for reference to the later volumes. Thus, for instance, albumin, casein, chondrin, fibrin, gelatin, glutin and several other albuminoid substances are not described in that order, but merely referred to the heading of Proteids. No doubt there are good reasons for dealing with these substances generally and collectively in regard to their intimate chemical relationship, but in a Dictionary of Chemistry one would naturally expect also to find descriptive articles on the several substances in their proper alphabetical place. With the sugars, the same course is adopted, dextrose, galactose and glucose being referred to the article Sugars in a subsequent volume, though cellulose and dextrin are treated of in their proper order. These references of such important substances to later portions of the work are sufficiently numerous to raise some doubt whether the whole of the subject matter can be dealt with in the space of four volumes, as proposed, especially when it is remembered that so much interest attaches to the substances comprised in the two classes of sugars and proteids. It must not, however, be supposed that these observations are offered in any captious spirit, though indicating, as we believe, partial defects in the work that are due rather to the vast extent of its subject than to anything else. At the same time it must be fully admitted that what has been done is well and carefully done in such a manner as to be of the greatest utility to all who desire to gain information or to make references to data and original memoirs in the course of their chemical work.

In recommending this work especially to pharmaceutical chemists we must of course appeal specially to those who take such a high view of their art as to believe that an intimate acquaintance with the sciences involved in its practice is an indispensable requisite. That there are some who think so we believe, and to them we offer the advice that they should possess themselves of the 'Dictionary of Chemistry' as being a store house of valuable knowledge which they may often find opportunity of turning to useful account. The more extended their scientific knowledge the better will they be able to adapt themselves to any requirements that may arise from the progress of chemical discovery. It is impossible to say what section of chemistry the pharmacist may suddenly find himself in contact with as a matter of his daily business. Only a few years ago scarcely anyone could have anticipated that the chemistry of the coal tar colours, though it sprang originally from an investigation directed to ascertaining the constitution of quinine, would eventually have become so prolific in furnishing materials for the manipulation of the pharmacist as medicinal agents.

Obituary.

Notice has been received of the death of the following:—

On the 31st of October, Mr. Charles Pride, Chemist and Druggist, High Street, Ruddington, near Northampton. Aged 45 years.

On the 10th of November, Mr. James William Guilmette, Chemist and Druggist, Crumpsall, Manchester. Aged 69 years.

On the 12th of November, Mr. Edmund Holt, Chemist and Druggist, Deansgate, Manchester. Aged 57 years.

On the 14th of November, Mr. Joseph Middleton, Chemist and Druggist, Cleveland Terrace, Middlesborough-on-Tees. Aged 52 years. Mr. Middleton had been a Member of the Pharmaceutical Society since 1869.

On the 20th of November, Mr. Edwd. Davenport, Pharmaceutical Chemist, St. Albans. Mr. Davenport had been a Member of the Pharmaceutical Society since 1850.

Correspondence.

Unqualified Assistants and the Sale of Poisons.

Sir,—A question I would like to ask in connection with this subject is as follows:—What is to be done with that large class of chemists' assistants who are under the age of twenty-one and unable to pass their Minor on that account? It seems rather hard upon them, and I do not see how as apprentices or assistants under twenty-one they are to gain the requisite knowledge to become pharmacists if they do not have the experience of handling, dispensing and selling poisons.

The recent action seems in this respect to savour of the old woman who would not let her boys bathe because they could not swim.

Does the word "sell" include the word "dispense," as poisons dispensed are ultimately for sale?

If proprietary articles, like Battle's Vermin Killer, already packed and labelled, and the poison itself probably never seen by the assistant, are liable, ought not patent medicines containing scheduled poisons to be placed under the same category?

I am pleased to see the Pharmaceutical Society has at last taken up the cudgels on this point, though personally, with regard to the recent action, I think the "extenuating circumstances" ought to have reduced the fine to *nil*, as a deal of allowance ought to be made for assistants situated as mentioned above.

I would suggest that when one becomes an Apprentice of the Society, if he shall have become or been apprenticed to a duly qualified chemist and fulfil the law with regard to obtaining signatures in poison-book, etc., he should be allowed to dispense and sell poisons under the supervision of a qualified man, who of course would be responsible for him. No employer would be foolish enough to leave a shop unless he felt he had a competent, although unqualified person to look after it in his absence. G. S.

Unqualified Assistants and the Sale of Poisons—Meeting in Sheffield.

Sir,—Permit me to correct a sentence which appears in your condensed account of my remarks at the above meeting. Instead of "He inferred that the phrase about 'any person who shall keep open shop' in the Act, referred not so much to any person in a registered man's shop as to any person who might sell poisons in the open air," the sentence should read,—"'Any person who shall sell,' in the 15th section of the Act, referred not so much to any person in a registered man's shop as to any person who might sell poisons 'elsewhere,' as, for instance, in the open air," etc. J. Preston.

The New Antiseptic.

Sir,—We learn from the medical journals and from your own note on the subject, that Sir Joseph Lister has added another to the now lengthy list of antiseptics. The newcomer is the so-called double cyanide of mercury and zinc, with which the distinguished surgeon has obtained excellent results in his practice. It has been ascertained that the salt employed by Sir Joseph has not the composition of a normal double cyanide, that it contains a much smaller proportion of mercury, and it has therefore been handed over to competent chemists for investigation. The result will be interesting, and assuredly the exact composition of the salt can only be determined by careful analysis. There are, however, some general remarks which it may be permissible to make before the appearance of the report referred to. In the first place, it is an almost invariable rule that when a soluble and an insoluble cyanide or iodide unite to form a double salt the product is soluble. It is, therefore, not surprising to find that the new antiseptic salt, which has been prepared in presence of, and been washed with, water, consists essentially of zinc cyanide. The product is not indeed a double salt at all. We know that oxide of copper which has been precipitated by caustic soda retains a certain amount of alkali which cannot be washed out, so in like manner the cyanide of zinc may retain a small proportion of mercuric cyanide. If the double cyanide is really formed in the first instance, it is certainly almost entirely decomposed by the subsequent treatment with water. It is just possible that the mercury is not present as cyanide, but as oxysalt or oxide, especially if an alkaline double cyanide is used at the outset. It might be worth while to try the antiseptic value of zinc cyanide mixed with a small proportion of mercuric oxysulphate, and thereby ascertain if such a mixture is not of equal value to the so-called double cyanide.

Edinburgh. D. B. Dott.

Estimation of Extractive and Specific Gravities of Official Tinctures.

Sir,—In the *Analyst* of this month will be found a paper with the above title by J. Spilsbury, F.C.S. The results published are in many cases very wide of the mark, and as the paper shows an amount of carelessness such as we would not expect from a pharmaceutical chemist, I venture to ask brother pharmacists not to be beguiled into placing their trust therein.

On comparing the list with the results of my own experience I find that though the great bulk of specific gravities sufficiently correspond as to be within a working average, some differ so much as to call for further evidence. Some of these are:—

		J. C. H.	J. S.
Tinctura	cinchonæ	·949	·939
,,	cinchonæ co.	·950	·937
,,	cardam. co.	·956	·944
,,	conii	·926	·942
,,	hyoscyami	·940	·930
,,	jaborandi	·943	·928
,,	pyrethri	·850	·860
,,	rhei	·943	·955
,,	stramonii	·925	·939

I do not think that the state of dryness of the drug would account for many of these disparities, especially of the last; it is more probably to the strength of the spirit employed or to improper exhaustion.

Besides the above, we have in Mr. Spilsbury's list two tinctures made with proof spirit, whose gravities are ·911 and ·893 respectively; considerably less than the menstruum employed. Surely these are not the averages of ten years' experience?

Another, and the most serious matter, is the fact that in this year of grace, 1889, the official tincture of sumbul as well as that of cinnamon should still be made with proof spirit instead of S. V. R.

With regard to the extractive matter, I have by me no personal estimations, but from a cursory glance at Mr. Spilsbury's figures I would doubt their accuracy. I do not see, for instance, how a tincture of ·939 gravity should give an extractive of ·48 per cent., while a tincture of ·926 gravity should give an extractive of ·9 per cent.

59, *George Street, Manchester.* J. C. Husband.

*** The publication of the foregoing letter has been unavoidably deferred through pressure of other matter.—[Ed. Ph. J.]

Querist.—We do not think that there is anything to justify the conclusion you seem disposed to arrive at.

Henry.—(1 and 2). We do not know that the constitution or composition of the compound is exactly understood. (3) The quantity of iron may be determined by incinerating and estimating the oxide of iron in the residue.

J. H.—We do not think there is a battery by which it can be done economically.

Clifford.—We have never seen more than one stone in the fruit, but the stone frequently contains more than one almond.

J. A. Knight.—We know of no work devoted specially to the subject, but useful information will be found in 'Pharmacographia' and Spon's 'Encyclopœdia.'

Inquirer.—Apply to the Secretary for a copy of the Regulations of the Board of Examiners.

Communications, Letters, etc., have been received from Messrs. Blunt, Tocher, Hooper, Taylor, Newsholme, Spurr, Welborn, G. S.

"THE MONTH."

New Soda Process.

In some experiments upon the decomposition of metallic chlorides by the electric current it was found that products which were readily soluble in the bath, as soon as they had accumulated to a certain extent always underwent further decomposition, but that this decomposition did not take place when the products were not soluble under the conditions in which they were formed. It therefore occurred to Professor Hempel that as sodium carbonate and bicarbonate are both only slightly soluble in a saturated solution of sodium chloride, it might be possible to obtain sodium carbonate and chlorine direct by the electric decomposition of such a solution whilst carbonic acid gas was being passed into it (*Berichte*, xxii., 2475). This was found to be actually the case, and that under suitable conditions chlorine is given off at one side and crystals of sodium carbonate are formed at the other. In the apparatus employed, which it is stated could be made of any size, a perforated iron plate was used as a cathode and a thin perforated carbon disc as an anode, the diaphragm being a disc of asbestos. Among the special arrangements was one for the removal of the soda crystals, and another for supplying sodium chloride in the place of that decomposed, so that the action was continuous. With a current of the strength of 1·73 ampères, produced by Bunsen elements, the separation of chlorine amounted to 0·930 gram per hour, and it is calculated that with a dynamo the yield per horse power, calculated as equal to 680 volt. ampères, would be 64·5 grams of chlorine and 258·9 grams of soda crystals ($Na_2CO_3+10H_2O$) hourly.

Sulphur and Carbon.

From Vienna comes the rather revolutionary announcement that sulphur and some other substances at present considered to be elements are really compounds of carbon (*Chem. Zeit.*, Nov. 6, p. 1476). The statement was made by Dr. Theodor Gross, in a communication to the Academy of Sciences, in which he offers the following evidence in respect to sulphur. A thin layer of precipitated sulphur, heated in a porcelain dish to ignition and then allowed to burn slowly, left a black skin, which when incinerated in the air without flame fell to a pale grey-brown powder amounting to about 0·2 per cent. of the original material. One part of this was placed in forty parts of potassium hydrate fused in a silver dish, five parts of potassium chlorate added and the whole heated until it no longer frothed. The fuse, when treated with water, gave a flocculent precipitate and the liquid, filtered off, gave with hydrochloric acid a relatively large quantity of carbonic acid. Upon heating the precipitate in dilute hydrochloric acid, with some nitric acid added, it dissolved all but a slight residue containing silver, and in this solution potash or ammonia produced a light flocculent precipitate readily soluble in acids. Sulphuretted hydrogen produced, after excess of alkali had been neutralized by potash, a light brown flocculent precipitate, which could be washed with hot water. This precipitate, according to Dr. Gross, contains a new body, the only known constituent being copper in traces. The dried precipitate when fused under access of air formed granules which had the appearance of melted selenium and amounted to about 2·5 per cent. of the pale brown powder obtained from the precipitated sulphur. Incinerated strongly for a minute in a current of hydrogen 2·7 centigrams lost 3 milligrams. The mass dissolved in hot strong nitric acid, and ammonia added to this solution in excess produced a precipitate that after being washed was readily soluble in dilute nitric acid. In this solution sulphuretted hydrogen again threw down a light brown precipitate, insoluble in potash or ammonia. The author thinks this substance cannot be an impurity, but that it is a carbon compound which is a decomposition product of the sulphur, and that the behaviour of precipitated sulphur under the conditions stated is related to the different modifications of sulphur.

Phenylhydrazids of Acids.

The phenylhydrazids are a group of compounds already known to be formed by the action of phenylhydrazin upon the chlorides, anhydrides and esters of organic acids; in a few cases they have been obtained also by simple heating of the base with the free acid, and in others by warming lactones with acetate of phenylhydrazin in aqueous solution. It has now been found by Professor Emil Fischer and F. Passmore (*Berichte*, xxii., 2728), that the formation of phenylhydrazids occurs much more readily than was supposed, and that a large number of organic acids, especially the oxy-acids of the sugar group, even in dilute aqueous solution, react readily with the base. The nature of the reaction consists in the combination of the hydroxyl of the carboxyl group in an acid with an amido hydrogen atom of the phenylhydrazin and the formation of the phenylhydrazid under the elimination of a molecule of water. In the case of a monobasic acid it may be represented by the equation:—

$$R\cdot CO\cdot OH+H_2N\cdot NH\cdot C_6H_5=R\cdot CO\cdot HN\cdot NH\cdot C_6H_5+H_2O.$$

The products are beautifully crystalline, those from the monobasic acids being moderately soluble in hot water and difficultly soluble in cold water; those from the polybasic acids are still more insoluble. They are easily purified, and by saponification with baryta water the acids can be readily regenerated and, after removal of the phenylhydrazin with ether, are in a state of chemical purity. As a rule the phenylhydrazids have definite and characteristic physical properties, which render them a convenient means of identifying organic acids that are otherwise difficult to distinguish from one another; but in those of isomeric acids, such as gluconic, galactonic and arabinosecarboxylic acids, the crystalline form, solubility and melting-point are frequently too closely similar to allow of their being utilized with certainty, and it is necessary for their recognition to regenerate the free acids. At first it was thought that the capability to form hydrazids was associated with the lactone-forming property of an acid, since negative results were obtained with glycollic, lactic and glyceric acids, and there seemed to be a limit probably between erythroglucinic acid and arabonic acid; but on the other hand formic acid and the highly oxidized polybasic succinic, malic and tartaric acids are converted under the same conditions into neutral hydrazids, and the same is the case with many of the aromatic acids, as, for instance, cinnamic and gallic acids. The facility with which a hydrazid is formed appears indeed to be dependent on the electro-negative character of the acid; when

this reaches a certain degree the hydrazid is formed at a temperature under 100° C., but below this degree a higher temperature is required. The presence of water does not retard the reaction. In using this reaction as a means of isolating an organic acid a moderately dilute solution, about 10 per cent., is treated with moderate excess of phenylhydrazin and an equal quantity of 50 per cent. acetic acid and heated for from half an hour to two hours on a water-bath. Sometimes the hydrazid separates while the liquid is still hot and sometimes on cooling. Any free inorganic acid in the solution should be neutralized with soda before adding the hydrazin, and in the case of sulphuric, hydrochloric and hydrobromic acids, which form not very soluble phenylhydrazin salts, their removal is advisable. If sugar be present the osazon formed by it can in most cases be removed by crystallization of the hydrazid from hot water. Nor is the value of phenylhydrazin as a reagent for aldehydes and ketones depreciated, since the hydrazids can easily be distinguished from the hydrazons by the ready decomposition of the former by alkalies, as well as by the characteristic red colour imparted by a drop of ferric chloride to solutions of them in cold concentrated sulphuric acid. The phenylhydrazids described in the paper are those of gluconic, galactonic, arabinosecarboxylic, dextrosecarboxylic, mannosecarboxylic, rhamnosecarboxylic, saccharic, malonic and gallic acids. It has also been found by Messrs. Fischer and Passmore that the acids of the sugar group combine in aqueous solution in an analogous manner with aniline to form anilids, but the reaction occurs more slowly and the products are much more soluble.

Optically Active Atropine.

It will be remembered that recent researches have shown that under certain conditions, such as contact with an alkaline solution, the lævorotatory alkaloid hyoscyamine undergoes intermolecular change, and is converted into the optically inactive atropine. It has also been found that when the tropine and tropic acid derived from the decomposition of hyoscyamine are combined, it is not that alkaloid but atropine that is formed. Upon the supposition that the inactivity of atropine might be due to it being composed of optically opposite constituents, attempts have been made to split it up into a dextrorotatory and a lævorotatory compound, and although this has not yet been accomplished, some results published in a recent paper seem to indicate that the problem is in a fair way of solution (*Berichte*, xxii., 2590). Experiments with the alkaloid having been unsuccessful, Messrs. Ladenburg and Hundt attempted the splitting up of inactive tropic acid by the action of *Penicillium glaucum* upon the ammonium salt, though without result. But upon the addition of a dilute solution of quinine in alcohol and water to a hot aqueous solution of pure tropic acid (melting point 116°–118° C.), in molecular proportions, evaporating the solution to the point of crystallization, and then cooling, there was at first a formation of an abundance of dull white crystals, whilst upon further concentrating the mother liquor an oil separated that gradually solidified to hard glassy crystals. The first crystallization proved on examination to consist of a dextrorotatory tropic acid compound, while the second crystallization consisted of a lævorotatory compound, the optical characters being still retained by the acid when set free from the respective compounds and purified. The two varieties of tropic acid were then combined with tropine, according to the method followed in the synthesis of atropine. The right-handed acid combined to form an oily base, that gradually crystallized in alcoholic solution, showed a dextrorotatory power of + 10°, and yielded a gold salt more difficultly soluble in hot water than that of atropine and melting at 146° and 147° (atropine 134°). The left-handed atropine was obtained as a crystalline powder, the gold salt resembling pretty closely that of hyoscyamine, but having a lower melting point (146° against 169°) The explanation offered for the difference between this left-handed product and hyoscyamine is that in hyoscyamine two active asymmetric carbon atoms are present, whilst in the synthetic compound there is only one. It is thought that it will be necessary to split up tropine in the same way as has been effected with the tropic acid, and that then from the left-handed tropic acid and the left-handed tropine it will be possible to prepare hyoscyamine.

Solanaceous Alkaloids.

In an interesting note upon the mydriatic alkaloids of the *Solanaceæ*, in *Merck's Bulletin* for September, it is stated that notwithstanding researches have in recent years gradually narrowed the differences supposed to exist between the chemical and physical properties of the principal Solanaceous alkaloids, they have tended on the contrary to increase the evidence as to differences in their physiological action. According to the writer the use of atropine is frequently contraindicated by a kind of idiosyncrasy, it giving rise in some cases to a peculiar variety of conjunctivitis, whilst sometimes it produces severe toxic symptoms. Duboisine and daturine are said to act much like atropine, but more strongly; nevertheless they are favoured in cases of idiosyncrasy against atropine. Hyoscyamine resembles atropine in general action, though it is less toxic; but it differs in being hypnotic in small doses. Hyoscine produces the atropine effect, but its action is more prompt, and its administration is not attended by such dangerous general symptoms as those sometimes following the use of atropine; it is also a hypnotic. Homatropine, the artificial alkaloid, enlarges the pupil and paralyses the accommodation as atropine does, corresponding almost exactly with that alkaloid in its maximum action, but it exhibits a much briefer continuance of the atropine effect.

Senegin.

Senegin, the glucoside occurring in senega root, the formula of which, according to the authors of Pharmacographia, "is not definitely settled," has been the subject of a fresh investigation by A. Funaro (*Gazz. Chim.*, xx., 21). Rochleder represented the composition and decomposition of the compound by the equation: $C_{32}H_{54}O_{18} + H_2O = C_{20}H_{32}O_7 + 2C_6H_{12}O_6$. But according to the author senegin has the composition represented by the formula $C_{32}H_{52}O_{17}$, and is decomposed according to the equation—

$$\underset{\text{Senegiu.}}{C_{32}H_{52}O_{17}} + 2H_2O = \underset{\text{Senegenin.}}{C_{20}H_{32}O_7} + 2C_6H_{12}O_6.$$

Senegin, therefore, if the latter equation be accepted, stands very close to Rochleder's saponin, but is not identical. The equation is said to be in accord with the results of analyses of the gluco-

side, and the quantities of glucose and senegin found.

Betel Leaves Oil.

At the Naturforscher meeting in 1888 Professor Eykman reported that among the constituents of the essential oil distilled from fresh betel leaves he had found a characteristic compound, having the odour of the leaves and the constitution of parallylphenol, which he designated "chavicol." About the same time Messrs. Schimmel announced that the phenol present in the higher-boiling fractions of the oil distilled from air-dried betel leaves corresponded completely with eugenol, though subsequently they made the modified statement that the phenol obtained by them was not eugenol but an isomer (*Pharm. Journ.*, [3], xix., 803. With a view to clearing up the apparent contradiction, Professor Eykman has re-examined the oil distilled by himself from the fresh leaves and some distilled from dry leaves by Messrs. Schimmel, with the result of confirming the presence in the former of chavicol, boiling at 236° to 238° C., and in the latter of the isomer of eugenol, boiling at 254° to 255°, which proved to be orthomethoxychavicol (*Berichte*, xxii., 2735). It would seem probable, therefore, that both phenols occur in the leaves, and that chavicol being the more volatile had practically disappeared from the dried leaves, while the method of distillation adopted by Messrs. Schimmel favoured the more complete removal of the higher-boiling compound. Some experiments made with chavicol are said to have shown it to be a powerful antiseptic, it being five times stronger as a bacteria poison than carbolic acid and twice as strong as eugenol.

Aqueous Solutions of Essential Oils.

It has been found by Herr Bergmann, that while mixtures of the fixed alkali soaps with hydrocarbons and essential oils form only emulsions in water, under separation of the respective oils, a mixture of an ammonia soap with an essential oil will form a clear solution in water, especially in the presence of excess of ammonia (*Chem. Zeit.*, Nov. 6, p. 1477). Turpentine oil, or some other essential oil, is first mixed with castor oil, or a mixture of it with other fat oil; the mixture is then subjected to the action of concentrated acid, and the product after being washed with solution of salt is saturated with ammonia in excess. Or the fat acids may be first separated by treatment of the fatty oil with concentrated acid, then washed with salt solution and the essential oil added either before or after saturation with ammonia. The preparation thus obtained is said to form a clear solution, and not only to possess the properties of a soap, but also to exercise in aqueous solution the solvent action of an essential oil.

Cod Liver Oil and Glycogen.

It is reported by Dr. Daremberg that he has established experimentally that in animals in which tuberculosis has been artificially produced, the disease runs a more rapid course if glycogen be introduced into the system either subcutaneously or with the food (*Deut. med. Woch.*, Nov. 14, p. 956). A weakening of the action of the glycogen attends the administration of cod liver oil in cases when the tubercle poison has been injected into the animal subcutaneously, but the oil is without effect when the injection has been intravenous. The oil does not appear to exercise any influence upon the poison itself; its action appears rather to consist in increasing the animal's power of resistance.

Absolute Iodoform.

Some months since (*March* 2, p. 705), reference was made in these columns to a method of preparing iodoform direct from the ley of the kelp industry, based on the reaction between acetone and nascent alkaline hypoiodite, produced by the action of hypochlorite on the alkaline iodide in the liquor. It is now announced by M. Castelhaz that this process is being carried out on the manufacturing scale near Rouen, and it is claimed that the iodoform produced is absolutely pure (*Répertoire*, Nov. 10, p. 481). It is described as occurring in micaceous scales of a fine pale yellow colour, soluble without residue in alcohol, ether, chloroform, and carbon bisulphide, and having only a feeble odour. This difference in odour from iodoform prepared in the usual way is explained by the fact that the reaction in the new process takes place in dilute solution in the cold, without the production of free iodine; whilst in the ordinary process the reaction between free iodine and boiling alcohol gives rise to the formation of hydriodic acid and secondary compounds, to the presence of which in traces the stronger odour is due.

Vinyl Alcohol in Ethylic Ether.

In attempting to purify some mercuric oxychoride from mercuric chloride by shaking a potassium or sodium bicarbonate solution of it with ether it was observed that in ten or twelve minutes the clear liquid became turbid and after a time deposited a white amorphous precipitate. It was further found that if the treatment were continued with fresh quantities of ether a point was reached when all the mercury previously in solution had been precipitated. After a thorough examination of ether from different sources Messrs. Poleck and Thummell have come to the conclusion that the precipitate was due to the mercuric oxychloride forming an insoluble compound with vinyl alcohol ($CH_2{\cdot}CH{\cdot}HO$), and that vinyl alcohol is a constant accompaniment of commercial ethylic ether (*Archiv*, Nov. 15, p. 961). This vinyl alcohol is considered to be produced not only during the manufacture of the ether but also through the oxidation of the pure ether by atmospheric oxygen under the influence of light, with the simultaneous formation of hydrogen peroxide. The same compound is also produced by the action upon ethylic ether of hydrogen peroxide, ozone or chromic acid. The progress of this oxidation of ethylic ether is analogous to that which takes place during the oxidation of zinc in the presence of air and water, and is represented by the equation—

$$\left.\begin{matrix}CH_3CH_2\\CH_3CH_2\end{matrix}\right\}O + O_3 = \underset{\text{Ethylic ether.}}{\left.\begin{matrix}CH_2CHOH\\CH_2CHOH\end{matrix}\right\}} + \left.\begin{matrix}HO\\HO\end{matrix}\right\}$$

Vinyl alcohol.

In the opinion of the authors it is the vinyl alcohol that gives rise to a brown colour when commercial ethylic ether is acted upon by potassium hydrate, whilst the acid reaction is due to acetic acid formed from the vinyl alcohol. Ether may be purified from vinyl alcohol by shaking it repeatedly with water or an alkaline solution of mercury monoxychloride, or by treatment with phenylhydrazin.

The acid salicylsulphonate of sodium has been made the subject of experiments by Dr. Zimmerli

to test its powers as an antiseptic (*Pharm. Zeit.*, Nov. 6, p. 675). The compound is represented by the formula $C_6H_3 \cdot OH \cdot COOH \cdot SO_3Na$, and the idea was that as it contains, like salicylic acid, a free carboxyl group, it would retain its antiseptic properties, which are diminished in the case of the sodium salt of salicylic acid, whilst it would be more soluble than that acid. The results showed that in antiseptic properties the compound ranks below salicylic acid, but above sodium salicylate. Acid sodium salicylsulphonate is described as a white crystalline substance, odourless, acid to the taste, freely soluble in water, slightly soluble in alcohol and insoluble in ether, and giving an intense salicylic acid reaction with ferric chloride. Experiments with sodium α-oxynaphtholsulphonate showed that body to possess only slight anti-fermentative power and it appeared to pass through the body undecomposed.

Sodium Salicylsulphonate.

Among other new antiseptics, experiments have been made by Dr. Zimmerli also upon the cresylic ethers of salicylic acid, in the expectation that they might prove more powerful than salol, which is a phenyl ether of the same acid (*Pharm. Zeit.*, Nov. 6, p. 675). The three isomeric cresyl ethers, ortho, meta and para, are described as white crystalline bodies, resembling salol in appearance, insoluble in water, but freely soluble in alcohol, the solution giving with ferric chloride an intense violet colour. The results obtained seemed to show that all three cresyl compounds possess certain antifermentative properties, in that they act as deodorants and possess the property of preventing the multiplication of bacteria by the ordinary process of division; but on the other hand the microbes are not killed, the influence being only inhibitory like that of salol. Compared with salol they are weaker in their action. The meta compound is said to occur as a fine powder, suitable as a dusting powder.

Cresyl Ether of Salicylic Acid.

Salicylsulphonic acid has been recommended by Herr Roch as a certain, delicate and convenient test for albumen (*Pharm. Centralh.*, Sept. 19, p. 549). The albumen is said to be thrown down by the acid as a white powder, having an acid reaction and giving with ferric chloride an intense red colour. The separation of albumen from a liquid is stated to be complete, 0·0005 gram in 10 c.c. being distinctly recognizable. In examining urine it is recommended to introduce a few crystals of the acid into a cubic centimetre of the liquid and shake, when the occurrence of turbidity may be taken as evidence of the presence of albumen, since the reaction is not affected by the presence of urea, uric acid, peptones, or glucose.

New Test for Albumen.

In a communication upon tannic acid Dr. Etti mentions that he has now obtained from oak barks of different origin a series of three tannic acid compounds represented by the formulæ $C_{16}H_{14}O_9$, $C_{17}H_{16}O_9$, and $C_{18}H_{18}O_9$, one from the bark of the red beech, with the formula, $C_{20}H_{22}O_9$, and another from hop strobiles represented by the formula, $C_{22}H_{26}O_9$. At present, therefore, the C_{19} and C_{21} compounds are wanting in this homologous series. Each compound is said to have its particular colour, ranging from brown red to light red. Whilst two of the acids from oak bark, when dissolved in very weak spirit, give with ferric chloride a dark blue colour like gallic acid, the other acids mentioned give with ferric chloride different shades of green.

Tannic Acid.

Mr. S. W. Hope testifies to the value of salicylic acid in the treatment of a common cold (*Brit. Med. Journ.*, Nov. 16, p. 1092). He states that if it be applied to the irritated lining membrane of the nose when sneezing manifests itself, and before any inflammatory action is established, a single application will be found sufficient to abort a common cold. The formula that he suggests is: "℞ Sodii salicylatis ʒiv., acid. boracis (pulv.) ʒj., cocainæ hydrochlor. gr. xxii. Mix by agitation, not in a mortar."

Salicylic Acid in Colds.

The common "eyebright" (*Euphrasia officinalis*), in addition to the wonderful virtues attributed formerly to it in the treatment of ophthalmic complaints, was considered to be "a great dryer." This part of its reputation appears to have been justified in the experience of Dr. G. M. Garland, who states that he has found it of great service in the treatment of acute coryza (*Bost. Med. Surg. Journ.*, Nov. 7, p. 453). The remedy was used in the form of a tincture (strength not given), which in ten drop doses in water is described as exercising a powerful action upon the recently inflamed mucous membrane of the nose and pharynx, reducing the secretion in a very short time. The tincture is said to have been found specially useful in the acute coryza of infants.

Euphrasia Officinalis in Colds.

Acting on the presumption that the efficacy of ipecacuanha in dysentery is due to its power of stimulating the liver and producing an abundant secretion of bile, Mr. Chowdhorry experimented in the Burdwan Hospital with perchloride of mercury, as likely to serve the same purpose without the nauseating effects. He reports (*Lancet*, Nov. 3, p. 901) that he has treated many cases with uniform success. In two of the cases reported a dose of 5 minims of liquor hydrargyri perchloridi in 2 drachms of water was administered every four hours, and in a third the same quantity of liquor in an ounce of water.

Mercuric Chloride in Dysentery.

Dr. W. W. Hardwick reports (*Lancet*, Nov. 2, p. 901) that he has obtained good results in the treatment of whooping-cough with a spray of a mixture consisting of eucalyptus oil, two drachms; terebene, two drachms; and rectified spirit one ounce and a half. The spray is usually ordered to be used half-an-hour before each meal and at bedtime. At the same time a drop dose of terebene, suspended in water by means of carbonate of magnesia, with the addition of compound tincture of camphor, is administered every three hours.

Eucalyptus Spray in Whooping-Cough.

The physiological action of tumbeki (*Nicotiana persica*) has been examined by Dr. Robinson (*Nouv. Remèdes*, p. 546), who finds that it diminishes the inhibitory action of the vagus nerve, thus giving rise to cardiac hypertrophy, and that it produces pulmonary catarrh and emphysema, although, singularly enough, it is used by emphysematous persons to promote expectoration. Dr. Robinson classes it with intestinal convulsants, such as calabar bean, belladonna and nux vomica.

Tumbeki.

Dr. Tabitski has published the results of

observations made in Professor Koshlakoff's clinic at St. Petersburg (*Practitioner*, Nov., p. 362), on the effect of bitter drugs in affections, such as gastric catarrh, in which their use would be indicated. The bitters used were gentian, wormwood and buckbean, in the form of the extractum amarum of the Russian Pharmacopœia. It was found that where deficiency of free hydrochloric acid in the juice was at the root of the indigestion, bitters given on an empty stomach a short time before food caused a decided improvement; but their beneficial action in cases of deficient peristaltic action was doubtful. The action of the bitters appeared to be to increase the amount of hydrochloric acid in the gastric juice, although the total quantity of gastric juice secreted did not seem to be larger.

Tonic Effect of Bitters.

In the *Medical Bulletin* (November, p. 348), Dr. Shoemaker directs attention to the use of hoangnan in skin diseases. He says that after having been engaged for some years in a study of the therapeutic virtues of this drug he regrets to say that his experience does not enable him to endorse the extravagant eulogies of some of its advocates, and that he cannot concur in the laudatory articles in various domestic and foreign periodicals which have recently been published. But he finds that it has a stimulant, corroborant or alterative action upon the cutaneous glandular systems, both perspiratory and sebaceous, but more particularly the latter. This he believes to be due to the accelerated circulation communicating increased tone to the muscular fibres surrounding the gland ducts. Hence both in seborrhœa and in alopecia he has found it very serviceable, and also in hyperidrosis. In anidrosis it often restores the function of the glands. In sycosis and eczema pustulosum he has also seen beneficial results arise from its use. But in a case of leprosy, three months treatment with hoangnan gave no satisfactory results, nor was it of use in erysipelas; but it answered well in various skin diseases accompanied by defective nutrition. He remarks that it contains strychnine and brucine, the latter in larger proportion, to which presumably the medicinal properties of the bark are due.

Hoangnan.

Sulphonal constitutes the topic of three separate articles in the last number of the *Lancet* (Nov. 23, pp. 1051 and 1053). In the first Dr. R. Percy Smith deals with the question that has been raised as to whether a prolonged use of this hypnotic is altogether harmless. Reference is made to observers who have been inclined to attribute symptoms of giddiness and ataxic disturbance to its influence, and Dr. Smith quotes the symptoms observed in some cases under his care in Bethlem Hospital as justifying the impression that it does in some cases interfere with the cortical motor functions. In all the cases, however, suspension of the administration of the sulphonal was attended by an immediate disappearance of the unpleasant symptoms, and, in some, re-administration after an interval produced no bad effect. In the second paper, Dr. Sutherland reports that he has found sulphonal to be a most valuable sedative in chronic insanity where the attacks of excitement are recurrent, but in cases where the excitement is continuous its effects are apparently injurious by increasing the state of excitement of the patient on the following day. A formula recommended by Dr. Sutherland for a draught is: Sulphonal, 20 grains; pulv. tragacanth, 20 grains; syrup aurantii, 1 drachm: water to 1 ounce. In the third paper, Mr. C. K. Bond arrives at the conclusion that sulphonal is of very great value in the insomnia of typhus, in inducing sleep without the disadvantage attending the administration of some other hypnotics of causing stupor leading up to coma.

Sulphonal.

The possibility of employing living organisms in the printing of photographic negatives promises to be of greater interest for the light it will throw upon certain physiological processes than for the addition it makes to the materials at the disposal of the photographer. In a paper read before the British Association, and just published (*Nature*, November 7, p. 16), Mr. Walter Gardiner describes how it is possible to utilize for this purpose the sensitiveness to light of the free-swimming swarm-spores, or protococci, of many green algæ. In operating, a water-tight box is used, fitted at one end with a thin glass plate, against which the negative to be printed is placed, film-side nearest. The box is then filled with water containing swarm-spores and exposed to diffused light. The swarm-spores make their way in the greatest numbers to the more highly illuminated parts and then settle upon the glass, so that at the end of from four to six hours a print in green swarm-spores is obtained which may be dried, fixed with albumen, stained and varnished. Mr. Gardiner then refers to the building up of proteid and protoplasm in the chlorophyll corpuscles of a plant, and especially the formation of starch under the influence of light, and states that if a plant, preferably with thin leaves, after being kept in the dark for a time, be brought into the light and a leaf be covered with a sharp negative, starch is formed in the greatest quantity in the parts of the leaf corresponding to those through which the brightest light is transmitted. Such a positive can be developed by suitable treatment with iodine, and if it then be subjected to the action of a silver salt, silver iodide is formed and a permanent print is produced.

Photography and Physiological Processes.

In the *Botanical Gazette* this month there is a very interesting account of the botany of Paraguay by Mr. Thomas Morong. He states that Paraguay is a remarkably rich country, considering its area, and remarks in illustration of the fact, that at the Paris Exhibition this year there were ninety-three specimens of its native plants that are used for medicinal purposes. He mentions one curious composite plant, in which the involucre of the flowerhead consists of a single five-toothed scale and five rows of curious yellow glands sunk beneath its surface, five flowers only in the head, five pappus scales, and stipules consisting of three to five-branched hairs. He also found an asclepiad, the flowers of which entrapped and held a large humming-bird moth by the proboscis. A convolvulaceous shrubby plant persisted in disarticulating its leaves, flowers and buds, so that even if the paper used in drying were changed every hour it was impossible to obtain a satisfactory specimen. As Mr. Morong has collected 750 species and 8000 specimens, there will probably be many interesting additions to botanical science when the plants have been examined and named.

Paraguay Plants.

The Pharmaceutical Journal.

SATURDAY, NOVEMBER 30, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

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THE SALE OF POISONS BY UNQUALIFIED PERSONS.

THE paucity of the correspondence that has been received on the subject of the sale of poisons by unregistered assistants and apprentices would appear to indicate that the question is not one which very profoundly moves chemists and druggists generally. Even the discussions that have taken place at Sheffield and Liverpool fail to furnish evidence of any strong feeling of objection to the interpretation that has been put on the law by the decision of Judge HOLROYD, and those individuals who do object to it admit at the same time that it would have a beneficial influence. So long, however, as it remains uncertain whether the decision that has been given will be carried before a higher court, it appears to us undesirable that the assumed question at issue should be discussed in this journal, as it is the organ of one of the "parties" to the litigation. For that reason we have confined our remarks on this subject to showing the purport and drift of the opinions that have been expressed by legal authorities, whose special function it is to interpret the Pharmacy Act as well as any other statute. The consideration of the subject from that point of view appears to be of more immediate importance than the intentions of the framers of the Act at the time it was passed, for in the present case, as in the case of the companies, it will be the interpretation of the Act by legal authorities that will count.

Assuming that the provisions of the Act in regard to keeping open shops are fully in accordance with the intention that every proprietor of a chemist's shop should be a legally qualified person, and admitting the proposition that in such a case the master qualifies the servant, it can scarcely be contended that he does so otherwise than by his direct supervision and control. Otherwise we should arrive at the absurd position that every chemist's business in the country might belong to one individual, and there would be no need for anyone besides himself to possess the legal qualification. This is the point that was dealt with by Mr. Justice GROVE in his judgment in the case of *Templeman* v. *Trafford*, and to illustrate his view he put the case of a person living in Aberdeen and establishing agencies throughout the country at a distance from his place of residence. Since that person could not at those agencies comply with the provisions of the Act in regard to the sale of poisons in the first part of Schedule A, he evidently could not be regarded as the "seller" referred to in the Act. He held, on the contrary, that the seller was the person who actually conducted the business of sale and who controlled the place of sale. This view of the Act is perfectly in accord with the intention that the person who keeps a chemist's shop should be qualified, but Mr. Justice GROVE went still further in his judgment by stating that it did not necessarily follow the mere hand to sell poison should be that of the qualified principal.

The opinions expressed in the judgment above referred to appear to offer a complete answer to the questions asked in the letter of our correspondent G. S. in last week's Journal. How, he asks, are apprentices to learn their business in regard to the sale of poison? and what is to be done with assistants under the age at which they can qualify? He is evidently under the impression that the recent decision goes so far as to indicate that an apprentice or unqualified assistant cannot under any circumstances supply poison. In this we think he is mistaken, and that he overlooks the proper application of the principle that the master qualifies the servant. A sale of poison or the dispensing of medicine containing poison by the hand of an apprentice or unqualified assistant would not, we imagine, be a breach of the law if conducted under the supervision of the master or some other qualified person acting for him. The answer to our correspondent's questions, therefore, is that the interpretation of the law taken by Judge HOLROYD does not raise any obstacle to the employment of unqualified assistants, provided the work they do in the sale or dispensing of poison be properly conducted under the supervision of the master or his legally qualified representative. Neither does it involve any danger that apprentices would be unable to gain the requisite experience in such work. On the contrary the recent decision rather supplies a security, not altogether unnecessary, that the teaching of apprentices this part of their business shall be effectively carried out by their masters with direct personal supervision. In such cases, we can imagine that the actual sellers or persons who hand over poisons would be free from any liability under the 1st and 15th sections of the Pharmacy Act, and that the masters would be the persons to whom the Act refers as the sellers that are to be held responsible. This is a very different matter from that contended for in the defence of the case decided by Judge HOLROYD, which was

that a master can depute his responsibility to an apprentice or other unqualified person, and leave them in his absence to do that which it is held on the other hand they would be entitled to do only in his presence and under his immediate direction.

We learn that on the initiative of Mr. H. Long, of Notting Hill, one of the Society's Divisional Secretaries, an association has been formed which is to be named the North Kensington Chemists' Association. At a meeting held at 48, High Street, Notting Hill, last Tuesday, numerous promises of support were received, and the next meeting was fixed for the 10th December at 9 p.m.

* * *

A complimentary supper in celebration of the golden weddings of two of the oldest chemists of Brighton, Messrs. W. D. Savage and J. W. Cornish, was held last week at Booth's Restaurant in that town. The chair was taken by Mr. Alderman Cox, and about twenty-five members of the Brighton Chemists were present on the occasion.

* * *

It has been decided by the Aberdeen and North of Scotland Society of Chemists and Druggists that an entertainment for assistants and apprentices shall be provided towards the end of January on the lines of the one held in March last.

* * *

In the last number of the *Moniteur Scientifique*, Dr. Quesneville called attention to the fact that next month fifty years would have elapsed since the establishment by him of the *Revue Scientifique*, the immediate forerunner of that journal, and stated that as he would at the same time finish his eightieth year, and was not in good health, he had decided with regret to discontinue the publication. Dr. Quesneville did not, however, live to put off the harness, having died in Paris on the 14th inst.

* * *

Another scientific worker, whose name was familiar to American pharmacists, and not unknown to the readers of this journal, has passed away in Mr. Rheinold F. W. Rother. Of German parentage, he graduated at the University at Michigan, and afterwards settled in Chicago and then in Detroit. He seems to have been a great benefactor to the College of Pharmacy, having presented to it land valued at upwards of ten thousand dollars. Mr. Rother was a somewhat voluminous writer on pharmaceutical subjects and the author of two manuals of pharmacy.

* * *

The next meeting of the Chemists' Assistants' Association will be held on Thursday evening, December 5, when a paper on "Methods of Cutting, Staining and Mounting Sections of Various Roots, Barks, etc., used in Pharmacy," by Mr. M. J. Cole, will be read, and Mr. Blackham will move a resolution condemning the prosecution of unqualified assistants for the sale of poisons.

* * *

The next meeting of the Dundee Chemists' Assistants and Apprentices' Association will be held on Thursday, December 5, when a paper entitled "Botany and its Relation to Pharmacy," by Mr. W. Muir, will be read.

Transactions of the Pharmaceutical Society.

MEETING OF THE EXECUTIVE OF THE NORTH BRITISH BRANCH.

A meeting of the Executive of the North British Branch was held in the Society's House, 36, York Place, Edinburgh, on Wednesday, November 20, at 1 p.m.

Present: Messrs. Boa, Gibson, Gilmour, Mackenzie, Stephenson and Thompson, Edinburgh; Fisher, Dunfermline; Hardie and Kerr, Dundee; Kinninmont, Glasgow; Lawrence, Oban; Maben, Hawick; Nesbit, Portobello; Paterson and Strachan, Aberdeen; Storrar, Kirkcaldy; and Watt, Haddington.

Apologies for absence were received from Messrs. Frazer and McAdam, Glasgow.

The minutes of last meeting were read and approved.

The report of the General Purposes Committee, from which it appeared that the expenditure for cleaning and painting in the Society's House amounted to a little over £20, was read and adopted.

Mr. Mackenzie, Edinburgh, moved that the gentlemen who had acted as examiners during last term should be nominated for re-appointment.

This was seconded by Mr. Storrar, Vice-Chairman, and unanimously agreed to.

The question of the sale of medicated wines, which had been adjourned from last meeting, was then taken up. In the course of a somewhat lengthy discussion several members strongly deprecated the idea of chemists as a body taking out wine licences. The general opinion seemed to be that many so-called medicated wines were simply used as a tipple, but some inconvenience had been met with in the case of certain preparations of pepsine and coca, which were strictly medicinal and in which wine was used as a menstruum.

Mr. Paterson, Aberdeen, moved, and Mr. Fisher, Dunfermline, seconded, the following motion:—

> "That the Executive of the North British Branch request the Council to approach the Board of Inland Revenue to ascertain their views as to the conditions on which chemists may sell medicated wines, such as pepsine and coca, without infringing the law."

Mr. Maben, Hawick, moved, and Mr. Mackenzie, Edinburgh, seconded the following amendment:—

> "That it be remitted to the General Purposes Committee, with powers to communicate with the Inland Revenue authorities on the question of the medicated wines."

On a division being taken a large majority voted in favour of the first motion, which was declared carried.

Mr. Watt, Haddington, said there was a matter which he wished to refer to in order to prevent any misconception. They were all aware of a recent vote in the Council as to the prosecution of an unqualified assistant for the selling of poison.

The Chairman: Is this case not still *sub judice*, Mr. Watt?

Mr. Watt said he merely wished to make a statement to prevent any misconception which might arise with reference to his views on the position of unqualified assistants. They were all aware that this prosecution was one which appeared to him at the time to be one not worthy of the Council to enter upon. This lad was an assistant of a qualified chemist, in a branch shop with a qualified manager, in whose absence he sold a poison, which was made up and required no skill or dispensing in giving it out. This young man was not of age and could not be qualified. They would understand, therefore, that he (Mr. Watt) had to decide purely on the question

before him, and that was whether the Council should prosecute a person who could not be qualified to sell poison, and who sold it in the temporary absence of the qualified manager. He believed it was held, and he understood there was a legal opinion to the effect, that an unqualified person could sell in the presence of a qualified master. The question resolved itself into this, whether this person learning his trade ought to be allowed to sell any poison, and whether he could properly learn his trade without being allowed to do so. That was the question they had to determine, and he thought though technically this young man committed an offence, yet it was one which was unworthy of the Society to prosecute or go on with. Of course they had the Coroner's opinion apparently pressing them to prosecute, and the majority of the Council were of opinion that they must do so. He would state this as a general principle, that the master was the person liable for the apprentice and for the assistant up to a certain age. He thought that during the time he could not be qualified he should be allowed, in learning his trade, to sell poisons, and the master should be held responsible. That was the doctrine he would lay down. The case itself was a very small one, but under it lay a very important question. It was a doctrine which was held and had been ably advocated by their President that the seller and the seller alone was the person who should be prosecuted. He did not think that view could be carried out by the Society to its legitimate results, and he believed it to be the foundation of a great number of the ills they laboured under. He was clearly of opinion that the Society was bound to go against the seller in all cases where he was of sufficient age and when he was acting where the master could not be present. He wished to make this statement to show why, as their representative, he voted as he did on the occasion referred to and to make it clear that he did not hold the view that the unqualified assistant was not to be prosecuted at all. All he meant was that when learning his trade or where the master was the responsible person he ought not to be prosecuted.

The Chairman said he had allowed Mr. Watt to make his explanatory statement, but he could not allow any discussion, as this matter was still *sub judice*.

The meeting then closed.

EVENING MEETING IN EDINBURGH.

The first evening meeting in Edinburgh of the present session was held in the Society's House, 36, York Place, on Wednesday, November 20, at 8.30, Mr. William Gilmour, F.R.S.E., in the chair. There was a very large attendance.

The minutes of last meeting having been read and adopted, apologies for absence were intimated from Mr. J. L. Ewing, Edinburgh, and Messrs. Frazer and McAdam, Glasgow.

The Chairman said he was glad to see so large an attendance at the beginning of another session of their evening meetings. It was rather interesting to go back to the time, now thirty-seven years ago, when these evening meetings were first started, and find that the gentleman invited to deliver the inaugural address on that occasion was Professor Sir Robert Christison, the distinguished predecessor of the lecturer that evening. During the interval that had elapsed since that time they had been addressed by such men as Professors Laycock, George Wilson, Archer and Crum Brown. It was hardly necessary that he should say anything in introducing one so well known to them all as Professor T. R. Fraser. He possessed a world-wide reputation as a pharmacologist, and was specially known to them as pharmacists in connection with his classical work in conjunction with Professor Crum Brown on the 'Relationship between Chemical Constitution and Physiological Action,' as well as by his recent exhaustive research into the natural history, chemistry and pharmacology of strophanthus. A few years ago, when it fell to the Council to fill the vacancy in their roll of honorary members caused by the death of Sir Robert Christison, it was unanimously agreed to elect Professor Fraser as the most eminent Scottish representative of the department of medical science most nearly related to pharmacy. He had therefore much pleasure in introducing the lecturer, not only as a distinguished professor, but also as, in a sense, one of themselves.

Inaugural Sessional Address.

BY PROFESSOR T. R. FRASER, M.D., F.R.S.

Gentlemen,—When your President invited me to give the opening address of this session of the Society, I readily complied with his request. I recognized that the work of the Society, in many of its aspects, is associated with some of my own occupations and interests; and I felt that this association had in a sense been rendered closer by the circumstance that the Pharmaceutical Society of Great Britain had conferred upon me the compliment,—which has been to me a source of much gratification,—of placing my name on the list of its Honorary Members.

This, the North British Branch of the Pharmaceutical Society of Great Britain, has existed for nearly half a century, and it can point to a record of usefulness, which is in many respects an encouraging one; for it has fostered and materially advanced the remarkable progress in pharmaceutical chemistry, and it has given the chief impetus to the improvement in the position of pharmacists and chemists which have occurred during the period of its existence.

It started under happy auspices, as its first President was Mr. Duncan, the founder of the great firm of Duncan and Flockhart, and its first Vice-President Mr. J. F. Macfarlan, whose name still lives among us in one of the chief establishments for the manufacture of organic medicinal substances; while its first Council comprised men of such note in scientific and business capacity as Mr. Ainslie, Mr. Baildon, Mr. Smith and Mr. John Mackay.

For several years its chief supporters were the pharmacists of Edinburgh; but from the first it aimed at being a Scottish and not merely a local Society, and it has gradually succeeded in attaining this position and, at the same time, in increasing its membership. In 1867 the Society possessed in Scotland 113 members and associates; in 1890 the number has grown to 304.

Besides this it has achieved other successes. The commodious building in which we are assembled is an evidence of its material advancement. In it has been collected an excellent Museum, valuable for reference, and admirably arranged and largely used for instruction; and a Library, representative of the history and of the present state of knowledge regarding the subjects in which the members of the Society are specially interested. Provision has also been made in the building for examination halls, amply furnished with the means for testing candidates, bright, comfortable and home-like, and far from suggestive of those "chambers of horrors" which their purpose might lead candidates to expect.

One of the high functions which the Society has had in view from its foundation—that of advancing by the work of its members the sciences that most directly bear upon the occupation of pharmacists—has also been faithfully and most creditably fulfilled. From its earliest days, most admirable communications have been made at its meetings, which have enhanced the credit and importance of the Society and furthered the interests of science. The good example placed

before them by their predecessors, has not been neglected by the present members. At recent Evening Meetings, papers have been read on the chemical relationships and characters of organic substances employed in the treatment of disease, on the improvement of forms for administration, and on the preparation and purity of medicinal substances; new drugs have been described and introduced to notice; and information has been given of the advances made from time to time in other countries.

The Pharmaceutical Society of Great Britain has, however, other important objects. Its charter of 1843 no doubt asserts in the preamble that the Society was established "for the purpose of advancing chemistry and pharmacy," but it also asserts that it was established for the purpose of "promoting a uniform system of education." The Acts subsequently obtained, in 1852 and 1868, were intended to facilitate the latter purpose by establishing a register of chemists and druggists, by giving to the Pharmaceutical Society the privilege of admitting men to this register, after due inquiry into their qualifications, and by encouraging them to become registered chemists and druggists by placing the compounding and dispensing of poisons in the hands of registered chemists and druggists.

A sufficient interval of time has elapsed since the passing of these Acts to justify inquiry into the success that has followed the means adopted for realizing the commendable aims of the Society, and, if it be the case that this success has not been in accordance with anticipations, for endeavouring to discover the reasons for failure or partial failure, and the changes that might be introduced to render the results more satisfactory in the future.

In searching for information to assist in answering these inquiries, I fortunately consulted Mr. Rutherford Hill, the Assistant-Secretary of the Society. He has most efficiently responded. Books, journals and pamphlets have been placed at my disposal in almost prodigal profusion. They have been sent to me not only from Edinburgh, but also from London; and I have almost been able to realize the sufferings of Tarpeia, who asked for only one gold bracelet, but had thrown upon her in addition the bracelets and shields of the whole army of the Sabines.

One fact I have certainly learned, and that is that the problem of education is assuredly engaging the attention of many of the leading pharmacists of Great Britain. A very slight application to the wealth of information placed before me has also been sufficient to show that the answer to my second inquiry is undoubtedly that many pharmacists consider that the means hitherto adopted for insuring a sufficient education of chemists and druggists have not proved altogether satisfactory.

These means appear to resolve themselves into a system of apprenticeship with examination, and the providing of opportunities for education by the establishment of a great school for pharmaceutical students in London, and by fostering, in a liberal spirit, local schools in various parts of the country.

In considering with a little detail the action thus taken by the Society, I shall not at present discuss the importance and place of apprenticeship as a means for furthering education; but lest, even for a moment, a doubt should be suggested as to my opinion on the subject, I will at once state that apprenticeship should always occupy a prominent place in any scheme for qualifying a man for an occupation so technical and commercial in its nature as that of chemist and druggist.

As to examination alone as a sufficient test of qualification, there is, unfortunately, in these days of universal examination, an abundance of evidence to prove its inadequacy. The best that can be achieved by it is to compel some sort of education; but it does so at an expenditure which is greatly in excess of its results, and it fails in the case of a large proportion of students. As a test of education it is uncertain and untrustworthy. When it is elevated to the position of the sole gauge of knowledge, it not only fails, but it also tends to degrade knowledge by substituting a pretence and a veneer for real education with its solid and lasting qualities.

The Pharmaceutical Society has, however, endeavoured to supplement the recognized insufficiency of examinations as tests of qualification by equipping a great School of Pharmacy in London, and by encouraging the establishment of local schools in many parts of the country. Every friend of education must regard the School of Pharmacy in Bloomsbury Square with pride. At its origin, it had the good fortune to secure as teachers Fownes and Redwood and Thompson, and its teaching reputation is well sustained at the present day by Attfield, Dunstan, Green, Holmes, and others. Notwithstanding these great advantages, and the further advantage of ample class rooms, laboratories, and teaching appliances, the expectations that had been anticipated of the place it would occupy in the education of pharmacists have not, I believe, been fulfilled.

The Society has also encouraged the establishment of local schools in various parts of the country, but their history has been far from an encouraging one Bristol, Birmingham, Newcastle and Manchester appear each to furnish a history of disappointment, of praiseworthy efforts and enthusiasm on the part of teachers and of local committees, and of lukewarmness on the part of students. Opportunities have been given, and students have been invited on most liberal terms to use them; but they have seemed to look upon the invitations with distrust, with what we might imagine to be the motives of a specially acute fly when refusing to walk into the spacious and attractive parlour of the famed spider! They have discovered that the time and labour which must necessarily be bestowed on the acquirement of real knowledge, and even the small pecuniary expenditure which is entailed in its acquirement, are superfluous, in order to secure for them the title of chemist and druggist. By less toil and by a shorter process they can successfully prepare themselves for the examinations that constitute the portals for admission to the Register of Chemists and Druggists. To this there could be no reasonable objection, were it not that the opinion of those best qualified to judge clearly indicates that the portal is too wide a one, and that it is in practice impossible sufficiently to narrow it. In fact, superficial information, that which is commonly implied in the word "cram," has proved too strong for the examiners, as, indeed, it usually does, and examination without the safeguard of an ensured and sufficient course of study has been ineffectual to secure the mental training and discipline and the acquirement of real knowledge, which constitute true education.

Some forebodings of this result appear to have existed for many years in the minds of the leaders of pharmacy, and one of the plans by which it may largely be prevented is to be found in the Bill of 1852, which contemplated the introduction of a compulsory curriculum of education as a safeguard to mere examination.

Although this safeguard was not incorporated in the Act of 1852, it has not been lost sight of. In the extensive literature bearing on the subject of pharmaceutical education, which I have had the opportunity of examining, I find that it has for years afforded a topic for discussion. Latterly, the advocates for its adoption have succeeded in their contention, and it now occupies a chief place in the Pharmacy Amendment Bill of 1889; which is, I believe, a measure

supported by the majority of the chemists and druggists, and likely in a short time to secure the sanction of Parliament.

When that sanction has been received, there will again be originated the difficulties that have previously been encountered, especially in England, of providing satisfactory classes for students. The discussions on the various schemes that have been proposed for this purpose have at least served to display what is impracticable or undesirable in several of them. They have served to render it improbable that the plans will again be revived of forming educational groups of small towns and villages, or of subsidizing, to any great extent, schools of pharmacy in the more populous centres. The recent establishment of colleges for higher education in many parts of England, the existence of similar colleges and teaching universities in the large cities of Scotland, make such plans altogether unnecessary, even if there were not grave educational objections to their adoption. As the subjects of pharmaceutical education are already represented in these universities and colleges, it is to be hoped that they will largely be adopted as the schools of the future chemist and druggist. They have in this country and in this city already been utilized for this purpose. It is to be hoped that the Universities of Scotland will in the future take an important share in this good work. There appears to be no sufficient reason why the education of pharmacists in botany, chemistry and materia medica should not at once be obtained in these Universities, and, with probably some amplifications also in theoretical, and, partially, in practical pharmacy. I can conceive of no more efficient method for elevating the position of pharmacy itself, and for giving to it and to its practitioners the status which they receive in Germany and elsewhere, than by following the example of the most advanced in education of the continental nations, by recognizing the claims of pharmacy within the Universities of Scotland and England. If the adjustments that would be required were effected, if the support from pharmacists that would be all important for the success of such a scheme were received, there is little doubt that it could be accomplished, and one of the chief problems of pharmaceutical education would soon be solved.

I believe that the time has now arrived when a further step may be taken. If the Universities should undertake the task of imparting education to pharmacists it would not be unreasonable to invite them also to confer some title of recognition, in the form of a diploma in pharmacy, upon those who have successfully undergone this education. If this were done it would be to the advantage of pharmaceutical education if the title conveyed a definite recognition, and of itself entitled to admission to the Register of Chemists and Druggists. To render this more easy of adoption the Pharmaceutical Society of Great Britain might be empowered to assume some efficient part in the examination of candidates for the diploma, either by appointing examiners, or by requiring that the University Courts shall appoint as an examiner in each subject of examination a member of the Society to act in conjunction with the University examiner.

Among the many advantages of such a scheme there is one which I think should not be lost sight of. Assuming that the powers of enforcing a curriculum contained in the Bill of 1889 are obtained, it does not appear certainly to follow that the evils of the present system of examination without an enforced curriculum will be altogether removed. Unless the scheme I have suggested, or some similar scheme, be adopted, the Examining Board would be still constituted of members who have taken no part in the education of the candidates. To this there are undoubtedly many grave objections. Each subject in the curriculum of pharmaceutical education is a wide and extensive one, and would necessarily be unequally treated by different teachers. Important subjects largely dwelt upon in the education of the student may have no interest for the examiner, while subjects of relatively little interest to the teacher may possess a great importance to the examiner. It would therefore either be impossible to assign any limitation to the range of subjects required from the candidate, or the candidate, by limiting, as far as possible, his studies to the range which rumour might justly or unjustly assign to the examiner, would neglect that which he is not likely to be examined upon, but which may actually be the most valuable instruction he has received. Further, the success of a teacher would be measured by the percentage of candidates who passed the examining board, and the temptation would be ever present so to teach as merely to pass men. The best teaching would in many cases produce a large percentage of failures, and a premium would be given for teaching which would not tend to produce the highest educational results. The very men from whom the advancement of the subject should be expected, would be degraded to the position of "crammers."

These are not extravagant suppositions; opportunities for their illustration unfortunately present themselves in systems of education and examination in this country. They are merely exemplifications of some of the evils of payment by results—evils that are largely accountable for the dissatisfaction in England with the Examining Board virtually constituting the contribution to education of the University of London, and for the establishment of Victoria University on the foundation of the Owens College, and they have become so generally understood that the abolition in general education of the system of payment by results must occur at no distant date. The alternative that I have suggested, which has had so remarkable a success in the Universities of Scotland, has no doubt in these days of ultra free-trade to contend against the cry of monopoly. If, however, monopoly in education implies that which is best for the student and for the subject, then monopoly is a good thing; and the attaching to it of a name which in respect to things not educational, frequently implies undesirable or disadvantageous qualities, should not be efficient in accomplishing its condemnation. But whether or not, in the future education of pharmacists a sufficiently close connection will be maintained between education and examination, much good may certainly be anticipated from the introduction of a compulsory course of study.

I think it may be assumed that this course of study has been foreshadowed in the excellent scheme of examination which is now in operation. The Preliminary examination in subjects of general education will undoubtedly be retained, and it is worthy of consideration if it should not be made in every case an actual preliminary to special pharmaceutical education; and also whether it should not include either French or German and book-keeping among its subjects.

The technical and trade character of the work of a chemist and druggist render it necessary that such a training as can best be obtained by apprenticeship should be retained. The importance of this training is so great that it might be advisable to adopt some plan that would ensure its fullest legitimate advantages. A certificate, for example, might be required from the master that sufficient opportunities had been given to the apprentice for practically engaging in pharmaceutical work—in the making of preparations and in the compounding and dispensing of medicines; and that the apprentice had diligently used these opportunities. The apprentice further should be encouraged to begin and complete his curriculum studies in botany, chemistry and materia medica at as early a period as possible in his apprenticeship.

As to the school studies, the only observations I would make are that for the higher qualification of pharmaceutical chemist, the histology of vegetable drugs should be included in the subjects of education and examination, and that there should be required from candidates for this qualification a thesis embodying the results of some original work related to one or other of the curriculum subjects.

Might I venture further to suggest that as the burden of supporting the machinery of education need not, and probably will not, to any large extent, fall upon the Pharmaceutical Society, the funds that would thus be available might well be applied for the encouragement of original research. Much creditable work has already been done by members of the Society. It has reason to contemplate with satisfaction the researches of Pereira, Hanbury, Howard and Groves; and the advancement of chemistry and pharmacy is being ably carried on by Wright, Paul, Dott, Holmes and many others, as well as by the work which is being conducted in the Society's Laboratories in Bloomsbury Square. The field is, however, a wide one, and the number of competent workers will be increased when the projected scheme of education has been adopted. By an application of funds for encouraging investigation, the credit of the Society, the reputation of its members, and the position of pharmacy would be greatly enhanced.

The question of education cannot be dismissed without some reference to another question, arising from and associated with it. The educational reforms that I have glanced at may be supposed to increase the difficulties of admission to the Register much more than is commensurate with any advantage that would be gained by pharmacists. There is possibly some slight foundation for this supposition. In all occupations to which any measure of State protection is given, it will be found that that protection is never a perfect one. If a good reason can be shown for extending protection it will generally be granted, but it is no doubt the case that it will be more speedily granted if an improvement in qualification makes it obviously for the advantage of the public that it should be granted. It would therefore be unwise to defer the obtainment of powers to raise the qualifications of chemists and druggists until protection has been given against, for example, the assumption by a corporation of unqualified persons of the rights and privileges of qualified individuals.

An improvement in education would also, I believe, lead to a larger share of the work of dispensing being obtained by chemists and druggists. I would unhesitatingly admit that medical men should not dispense medicines unless they are obliged by circumstances to do so. In many districts of the country, however, local conditions and the prejudices of the inhabitants make it difficult for medicine entirely to divorce itself from the trade of pharmacy. In many districts, also, medical practitioners do not find that skilled and efficient pharmacy can be obtained. On the whole, it must be conceded that the advance that has been made in medical education, within recent times, has considerably diminished this ground of complaint against the medical profession; and it may be anticipated that the preparation and especially the dispensing of medicines will more and more be given up to pharmacists.

With increased qualifications, also, remunerative occupation may be found in other directions. It has been suggested, and I see no good reason why the suggestion should not be adopted, that at any rate the higher grade of pharmacists, by extending their education somewhat beyond the present requirements, might qualify themselves to undertake the work of public analysts. The occupation is one that is certain to grow in importance under the changed conditions of local government that have been initiated.

But, gentlemen, is it necessary to consider whether an improvement in education, generally acknowledged to be necessary, should be delayed in its adoption until it has been shown that some further advantages will at the same time be obtained? The advantages consequent upon the improved education are surely in themselves sufficient. The diffusion of knowledge has now so rapidly extended, that its influences are apparent in almost every occupation and rank in society. Pharmacists cannot afford to stand still. Medical knowledge has advanced conspicuously in those directions in which it comes into contact with pharmacy; and medicine requires keener tools, more exactly adapted to produce precise effects, than were formerly demanded, and therefore greater knowledge, attained by improved education, in those who supply these requisites. This greater knowledge will also be the most effectual agency in raising the position of pharmacy, and in gaining for pharmacists a higher public consideration. Above all, it will render more intelligent and will widen the interest of the pharmacist in his every day work.

Mr. J. B. Stephenson moved that the meeting accord their best thanks to Professor Fraser, to whom they were highly indebted for the interesting and valuable address to which they had just listened. He had thought a University man might probably need to be kept right in reference to the affairs of the Society, and probably most of them would be surprised to find the Professor so conversant with pharmaceutical matters and so interested in them. He had shown a very exact knowledge of the position of the Society, and it was certainly very grateful to them all to hear him taking such an appreciative view of their actings and contendings during the last forty years. He felt sure that the Professor's suggestions and hints would give very great encouragement and satisfaction to the members of the Society. He considered the remarks on education and examination specially valuable, and he believed they would be welcomed as an important contribution towards the attainment of the object the Society had at present in view.

Mr. Paterson, Aberdeen, said he rose to second the motion as a country member. He had listened with much pleasure to the address, and he felt that the Professor had put forward the plea for a curriculum in a way which would go far to make it more acceptable in the North than it had hitherto been. There had always been a feeling that the curriculum proposals meant a great centralization of pharmaceutical education in Bloomsbury Square, but the suggestions put forward by Professor Fraser would go a long way to remove all such objections. He would like to see a closer intimacy between the Universities and pharmacy, and it was pleasant to find that they had an advocate so eminently qualified in the ranks of the professoriate. As a practical outcome of that evening's proceedings he thought it would be well for them to consider in what way the Society might approach the new Scottish University Commissioners in order to ascertain how the views sketched by Professor Fraser could be given effect to.

The vote of thanks was cordially awarded with acclamation and formally conveyed to the lecturer by the Chairman.

Professor Fraser in reply said he was much gratified by the way in which he had been received by that large meeting. He was especially gratified by the kind terms in which the mover and seconder of the vote of thanks had referred to his address, and which led him to think that he had succeeded to some extent in appreciating the present condition of things in pharmacy, and in venturing, not too boldly, to sug-

gest some things that it might be desirable to do in order to meet the requirements of the case. He thought they in Scotland were in a much more favourable position to carry out such ideas than was the case in England, where the facilities for the teaching of science were not so great. In Scotland they had the advantage of a University system which could be readily adapted to all kinds of requirements. He thought that if the proposal for bringing together pharmacy and the Universities met with a favourable reception, there need be no great difficulty or delay in getting a workable scheme.

The Assistant-Secretary then directed attention to, and briefly described the following additions to the Museum.

Specimens of Sodium Salicylate in scales, and Sodium Salicylate from the natural acid.

From Mr. ALEXANDER KINNINMONT, F.C.S., Glasgow.

Leaves of *Hamamelis Virginica.*

From Mr. D. F. MACDONALD, Edinburgh.

Flowering branch of *Rhamnus Purshianus.*

From Mr. PETER MACEWAN, F.C.S., London.

Specimens of *Barbaloin* and *Socaloin.*

From Messrs. T. and H. SMITH, Edinburgh.

Seeds of *Entada scandens*, Maranta starch, "Mujun," a sweetmeat made from *Cannabis Indica*, and fruit of *Myristica fragrans* preserved fresh.

From Mr. THOMAS STEPHENSON, Bombay.

Fine specimen of Cascara Sagrada bark, Eucalyptol, Exalgine in two crystalline forms, Fiji Sandal Wood Oil, "Guap," a South African *Stapelia*, seeds of *Kickxia Africana*, Ores of tin, zinc, lead, copper and uranium from St. Martin's Lode, Cornwall, stem of *Pinus Balsamea*, smooth variety of *Strophanthus* seeds from West Africa, two specimens of Commercial Tragacanth Gum.

From the MUSEUM, 17, Bloomsbury Square.

In a note from Mr. Holmes it was pointed out that the smooth *Strophanthus* seeds contained an admixture of the common hispid variety.

On the motion of the Chairman a cordial vote of thanks was awarded to the donors.

The Assistant Secretary also mentioned that members had often been annoyed in coming to consult volumes of the *Pharmaceutical Journal* to find that the one they wished to refer to was out on loan. He had now obtained a complete duplicate set, and one set would always be kept for reference and the other for lending.

The meeting then closed.

Proceedings of Societies in London.

CHEMICAL SOCIETY.

A meeting of the Chemical Society was held on Thursday, November 7, Dr. W. J. Russell, F.R.S., President, in the chair A number of certificates were read for the first time and the following papers were read—

Isolation of a Tetrahydrate of Sulphuric Acid Existing in Solution. By S. U. PICKERING.—The freezing points of mixtures of sulphuric acid and water form three distinct curves, representing the crystallization of water, of $H_2SO_4 \cdot H_2O$ and of sulphuric acid respectively: in each of them the highest point is in exact correspondence with the composition of the substance which crystallizes out. No solutions containing between 75 and 40 per cent. of acid had yet been frozen, but it appeared to the author that if his former deductions from the irregularities in the curves representing the densities and other properties of solutions of the acid were correct, an independent curve representing the crystallization of a new hydrate should occupy this interval, and that this new hydrate could only be either $H_2SO_4 \cdot 5H_2O$ or $H_2SO_4 4H_2O$. Experiment has proved that it is the latter. The two branches of the new curve obtained rise from about —80°, and meet in a sharply marked angle at a point exactly corresponding to the composition of the tetrahydrate, the temperature at which this point is reached being —25°. The tetrahydrate forms large, well-defined, hard crystals. Apart from the consideration that the isolation of this hydrate was the direct outcome of his having previously recognized its existence in the dissolved state, the author maintains that the crystallization of a substance from a liquid necessitates the recognition of its existence in that liquid. The various possibilities are (1) that the solid constituents solidify separately in the proper proportions, and subsequently combine; this view is obviously untenable; (2) that the molecular aggregates constituting the solid are formed directly from the acid and water; this means that a hydrate has no fundamental molecule, and besides leaves the impossibility of explaining how these solid aggregates can hunt each other out, and congregate to form large crystals; (3) that fundamental molecules of the hydrate are formed in solution, but cannot remain there, and consequently separate out almost immediately; this is tantamount to saying that the hydrate is an insoluble substance, a proposition which could scarcely be maintained even if the substance were not crystalline; (4) that the molecules of the hydrate are formed in the liquid, and exist there till the temperature is lowered below its freezing point. This, in the author's opinion, is the only tenable hypothesis. When a liquid freezes and melts at a definite temperature; when the temperature remains constant till the whole of the liquid is frozen; when any alteration in its composition lowers its freezing point; we have the most certain evidence yet adduced for regarding that liquid to be a definite, though possibly somewhat dissociated, compound. If we deny this argument as applied to the hydrate in question, we must deny it in all cases, and conclude that no liquid is a definite substance. The author does not argue that the mere fact of the existence of the liquid hydrate at —25° implies its existence at the higher temperatures (8—38°) at which his density and other determinations were made; on the contrary, he argued that because it existed at the higher temperatures it must exist at the lower ones, and having proved this to be a fact, he holds that the premisses from which his conclusions were drawn must be correct. The author believes that the dihydrate may yet be obtained as a solid, since there is a reach of 7 per cent. in its vicinity where freezing points have not yet been attained. He has also isolated another hydrate which crystallizes in small quantities with the monohydrate, but has not succeeded in determining its composition.

Additional Observations on the Magnetic Rotation of Nitric Acid and of Hydrogen and Ammonium Chlorides, Bromides and Iodides in Solution. By W. H. PERKIN, Ph.D., F.R.S.—In his previous experiments (*cf.* 'Proceedings,' 1889, p. 83) the author had limited his observations on nitric acid to the pure acid HNO_3; he has now examined a somewhat diluted acid, and the results obtained indicate that HNO_3 unites with water, forming an acid analogous to orthophosphoric acid, viz., $(HO)_3NO$. The experiments on hydrogen chloride, bromide and iodide were originally made on single samples in a very concentrated solution of each. These gave abnormally high results —rather more than twice the values calculated for the pure compounds—but on examining solutions of different strength it was found that the rotation *increases* up to a dilution equivalent to about 6 or 7 mols. of water to 1 mol. of hydrids, the value then remaining practically stationary. To see whether the solvent had any influence, a solution of hydrogen chloride in isoamyl oxide was examined, and was found to give

values nearly identical with those calculated from the chlorine derivatives of the paraffins; and there can be little doubt that if the other hydrides could be examined in a similar way analogous results would be obtained. As union with water should reduce the rotations, the results at present are quite inexplicable. The compounds with ammonia and the compound ammonias have been also further examined. The results are remarkable when considered in relation to those afforded by the hydrides, as the rotations found, instead of being those calculated from the results obtained in the case of paraffin-derivatives, or those *found* in the case of hydrogen chloride dissolved in isoamyl oxide, nearly correspond to those required on the assumption that the hydrides are present in aqueous solution together with ammonia. The rotations, however, do not vary with the strength of the saline solutions. The author's explanation of this is that when the salts are dissolved in water they dissociate almost entirely into the hydride and the amine, the hydride undergoing an increased rotation on account of its being in aqueous solution. In the case of triethylamine chlorhydride the numbers are lower, and there is evidently less dissociation; and in the case of tetrathylammonium chloride little or no dissociation appears to take place. Solutions of ammonium iodide and diethylamine chlorhydride in absolute alcohol gave somewhat lower numbers than aqueous solutions, indicating a somewhat smaller although large amount of dissociation. As already noticed, ammonium nitrate gives numbers very close to the calculated; apparently it does not dissociate to any appreciable extent. As the author was not satisfied with the numbers obtained for neutral ammonium sulphate, the acid sulphate was examined, and this gave the calculated numbers; these, when compared with those for the neutral salt, show that the latter undergoes dissociation to a small extent when in solution, which is in agreement with the well-known fact that its solution in water gives off ammonia when heated. The examination of these oxy-salts shows clearly that the salts containing hydrogen chloride, bromide and iodide, when in aqueous solution, are in a very abnormal condition, but a condition which is easily explained if they are in a state of dissociation.

Dr. Gladstone said that when the refraction equivalents of the hydrides of the halogen elements and of nitric and sulphuric acids in solution were first determined, it was observed that the values were far higher than those calculated; but on re-examining hydrogen chloride solutions he had recently found that as the amount of water was increased a slight increase in the specific refraction also set in, quite analogous to that described by Dr. Perkin. The whole subject of the behaviour of such substances in solution deserved a full and deliberate investigation, with reference especially to the possible occurrence of dissociation. He had little doubt that some dissociation did occur in the case of the ammonium salts. As it is well known that increase of temperature greatly promotes dissociation, it would be well to repeat the observations at various temperatures in order to learn whether a change takes place in the refraction and magnetic rotation. On examining Dr. Perkin's solution of hydrogen chloride in amyl oxide, he found that the refraction and dispersion values deduced for the chloride are very much smaller than those afforded by aqueous solutions: thus another case of correspondence between the three properties of magnetic rotation, refraction and dispersion of light was made evident.

Professor Ramsay, referring to the high values observed by Dr. Perkin in the case of dilute solutions, drew attention to recent speculations concerning the occurrence of atomic dissociation in solutions, and asked, might not the high values be explained by assuming that hydrogen chloride underwent dissociation into hydrogen and chlorine atoms?

Dr. Armstrong said that although it might be argued from the results obtained with aqueous solutions that atomic dissociation attended dilution, the fact that normal values were obtained when amyl oxide was used as solvent was evidence of the insufficiency of such an explanation, and clearly indicated that the water played an active part. According to the now fashionable dissociation hypothesis, the solvent acted merely as a diluent, as one gas does to another, dilution corresponding to reduction of pressure; on this hypothesis, therefore, the values obtained should be the same for solutions of equivalent strength in either solvent. Dr. Perkin's results appeared to indicate that a certain proportion of the water molecules—those which were carried round, as it were, by the hydrogen chloride molecules—underwent what might be termed *extra* rotation. Dr. Perkin based his conclusion that hydrates would afford lower and not higher values on the results which he had obtained in the case of compounds such as the hydrates of nitric and sulphuric acid, and of aldehyde and of chloral; but these were all hydrates of compounds containing polyad elements; the behaviour of mixed elements might well be peculiar. In fact, in discussing these questions valency must be taken carefully into consideration. Dr. Gladstone had suggested that observations should be made at various temperatures; such observations would undoubtedly be of importance, and might even be expected to afford a final settlement in favour of one or the other hypothesis. If the increased rotation be conditioned by hydrates, as such hydrates would undergo dissociation on heating, the values would diminish as temperature rose; but if atomic dissociation took place, the change would be in the contrary direction, although, as the effect of temperature in promoting atomic dissociation is often not very marked until a somewhat high temperature is attained, the effect of moderate heating would not necessarily be exhibited by an increase of the rotation.

(*To be concluded.*)

CHEMISTS' ASSISTANTS' ASSOCIATION.

A meeting of the Chemists' Assistants' Association was held on Thursday evening, the 21st instant, Mr. Ellwood, President, in the chair. A paper was read on—

Oleate of Mercury.

BY R. C. HARRISON.

Bearing in mind the vigorous and running fire of criticism to which the last edition of our Pharmacopœia was subjected, it would seem somewhat difficult to find a preparation that has not fallen in for its share.

So far as I am aware, oleate of mercury has escaped as yet; but few pharmacists will fail to have noted the very great deficiency in keeping properties of the present official article, which includes the 10 per cent. and 20 per cent. varieties, and to have been annoyed on being called to dispense it to find it of a dirty grey colour, with a yellowish oily liquid floating on the top.

I hope this evening to lay before you some of the different methods that have from time to time been suggested, all of which have either the objection of not being permanent, or the great trouble entailed in their manufacture; and to lay before you a process that I have found produce in a quick and easy manner a permanent and true salt.

The two chief methods are (1) the precipitation of a soluble mercury salt with either sodium or potassium oleates, and (2) the solution of the oxide of the metal in excess of oleic acid. My objection to the former is the contamination with stearates and palmitates when made from soap, as suggested by Dr. Wolff, and when made from pure oleate of the alkali, the tremendous

time and trouble in collecting and washing the precipitate and ridding it of the water. True, my first objection may be removed by solution in ether or some other solvent, but here is an unnecessary addition to time and trouble, and consequently to cost as well, with the result of a product inferior in keeping properties. To the second process the great objection is its deficiency in permanence and its irritating properties when so reduced, due, according to Dr. Tichborne, to the production of oxyoleic acid.

The following are some of the methods which have been advocated:—

A. P. Brown (*Am. Journ. Pharm.*, p. 168, 1889) recommends boiling white castile soap with powdered $HgCl_2$ and a little water till an oily yellow liquid is formed, which is cooled and washed and excess of water driven off by the water bath.

Wolff, in the same journal for November, 1881, advises a similar method with subsequent purification from palmitate by solution in petroleum ether. He says respecting it being a *true* combination, "a solution of a metallic oxide in acid without a reaction or the presence of water cannot be considered a salt according to the present views of chemical knowledge." (Respecting this see Drs. Squibb and Tichborne and E. Painter.)

Oldberg's unofficial pharmacopœia advocates dissolving separately the red oxide in nitric acid, and caustic potash in dilute alcohol, saponifying with this latter solution a sufficiency of oleic acid, and then pouring the mercury solution into this soap solution, washing with water, adding sufficient soft paraffin to make the product contain 10 per cent. HgO and evaporating off water.

Rossenwasser (*Druggists' Circular*, Jan., 1881) uses a process similar to the preceding, and states the soft paraffin prevents the reduction of the metal.

E. Painter ('Proc. Am. Pharm. Assoc.,' 1885) says, the red oxide is preferable to the yellow, and condemns the use of heat; and also says "the idea that true oleates are not formed by solution of the oxide in the acid is as absurd as saying an oxide is not dissolved in a mineral acid."

U. S. P. directs the temperature not to exceed 165°, otherwise it is similar to our official process.

Dr. Squibb (*Ephemeris*, November, 1882) advocates the solution of the oxide in acid, and considers this forms a true salt, and instances the same reason as Painter. He considers normal oleate of mercury contains 28·4 per cent. of oxide (he does not consider the water; it actually contains 27·7 per cent.).

Gmelin, vol. xvii., p. 73, says the mercurous salt may be made by digesting oleic acid and Hg_2O; or precipitating $HgNO_3$ with potassium oleate. It occurs in whitish-grey flocks turning blueish after drying. The mercuric salt he obtains by precipitating Hg2 NO_3 with potassium oleate.

Rice (*Amer. Journ. Pharm.*) says: "The amount of reduction is in direct proportion to the degree of temperature employed, as indicated by the following table. 192 grains of HgO corresponding to 177·7 grains of Hg heated with 10 times its weight of oleic acid gave the following reductions:—

At 300° F.	amount of reduced Hg	= 175	grains.
280° F.	,,	= 152	,,
212° F.	,,	= 69	,,
200° F.	,,	= 35	,,

Professor Tichborne (*Med. Press*, Sep. 24, 1884) condemns the process of precipitation to form a neutral oleate, as he considers very little neutral oleate is formed, but chiefly an acid oleate. He recommends the solution of the oxide in the acid, and says: "If we let the oleate stand for some considerable time the water seems to be assimilated, and a hydrate is formed," and "if the oleate is gradually heated on a water-bath to 100° C., the water is slowly given off, and long before the theoretical quantity is lost the oleate begins to decompose," and he goes on to say that *no* heat should be used in the manufacture. He considers the reduction is due to the formation of an irritating oxyoleic acid formed at the expense of the oxygen of the HgO. He recommends $2\frac{1}{2}$ parts of levigated red oxide for 5 parts of commercial oleic acid (which is theoretically 25 per cent. too little for a neutral salt); he gives no details of process, but indicates we must possess suitable machinery to ensure success, which possibly we all do not.

Dr. Shoemaker's method of precipitation is so well-known as to be hardly necessary of repetition. In connection with this product, though, he said in a lecture delivered by him at Westminster Hospital, July 4, 1884, "he preferred the mercurous salt made by precipitation from $HgNO_3$ to the mercuric; it was one and a half times stronger, had a flocculent leaden colour like that of mercurial ointment due to reduction.

Dr. John Marshall recommends the oxide, made by precipitation from the nitrate, being dissolved in oleic acid, and considers the solution of the oxide is assisted by a temperature of 300° F., and describes thus the products of different strengths:—"The 5 per cent. solution is a perfectly clear, pale, yellow liquid, resembling olive oil, but thinner; the 10 per cent. solution is also fluid and perfectly clear, but as dark as linseed oil, whilst the 20 per cent. preparation is an opaque, yellowish, unctuous substance, closely resembling resin ointment in appearance, melting very readily at the temperature of the body and forming a kind of transparent, viscid, colourless varnish when applied to the skin. The chief care to be observed in the manufacture of these solutions is not to hurry the process, and not to employ too high a temperature, or the mercury will be immediately reduced."

It will be seen then there appears to be a great diversity of opinion upon the matter, especially in three particulars:—(1) As to whether the method of dissolving the oxide in the acid, or that of precipitation, is more preferable. (2) As to whether heat is necessary or detrimental. (3) As to whether a true chemical change takes place or no. To these queries I would answer, as results of my observations:—

(1) The solution of the oxide in the acid is preferable, as the product appears to be more readily absorbed by the skin; if true chemical action takes place (as I believe to be the case) the result must be a definite compound, which is not necessarily the case with the salt made by precipitation (see Tichborne). (2) In making a *normal or true* oleate heat is not detrimental, but useful; in making a 10 per cent. or 20 per cent. preparation containing excess of acid, it undoubtedly does cause reduction, if great care is not used, due, most likely, as observed by Professor Tichborne, to oxidation of the oleic acid at the expense of the oxide. (3) I should consider a true chemical change does take place with the formation of water, reason for which I will consider later on.

My first attempt at making a true normal oleate of mercury was some six years ago, by precipitation. I took commercial oleic acid and placed it in ice to free it from stearic and palmitic acids, decanted the clear portion, and saponified this with an equivalent of dried sodium carbonate. I then poured into this soap solution one of mercuric chloride, when the oleate of mercury was precipitated in white flocks. This was thrown upon a filter and washed to free it from chlorides, which was effected at last after no little trouble, by rubbing it with successive portions of water in a mortar. The resulting product was of a greyish, white colour, soapy and somewhat tenacious to the touch. This kept well for two years, when I lost sight of it.

It occurred to me, when the subject cropped up again last year, a similar reaction might possibly

occur between mercuric oxide and a fixed oil in the presence of water as occurs between lead oxide and oil in the manufacture of lead plaster, whereby a lead oleate is formed and glycerine obtained as a bye product. I precipitated mercuric oxide by pouring a solution of the perchloride of mercury into one of sodium hydrate, and took of this oxide 64 grains and heated it on a water bath with 176 grains of almond oil (this was chosen as being the purest oil) and a little water for several hours. After several attempts with negative results, I took a portion that had been so heated and shook it up with ether, decanted the clear solution, evaporated off the ether, and from the residue warmed with hydrochloric acid and a few drops of nitric acid, I got, both with stannous chloride and potassium iodide, precipitates indicative of the presence of mercury, which proved reaction had taken place, but only to a limited extent, probably according to the following equation:—

$$2C_3H_5(C_{18}H_{33}O_2)_3 + 3HgO + 3H_2O = 3Hg(C_{18}H_{33}O_2)_2 + 2C_3H_5(OH)_3$$

I then turned my attention to a simple solution of the oxide in the acid, in the proportions necessary to make a salt of the formula $Hg(C_{18}H_{33}O_2)_2H_2O$, which Tichborne considers to be the true formula. The following is presumably the reaction which takes place:—

$$HgO + 2HC_{18}H_{33}O_2 = Hg(C_{18}H_{33}O_2)_2H_2O$$

I resolved to try digesting an excess of oxide with oleic acid, and dissolve out the oleate with ether from the undecomposed oxide. So I took 60 grains (excess) of freshly precipitated oxide, mixed it with 141 grains of oleic acid, and heated it on a water-bath for half an hour, when it had assumed a light yellowish brown colour and become almost solid, very sticky, and scarcely any oxide apparent to the eye. This I shook up with ether ·720, when nearly the whole of it dissolved, the undissolved portion consisting of mercuric oxide. I evaporated off the ether and obtained a softish, sticky solid, somewhat translucent. This, however, I found in the course of a week had changed to a complete grey colour, due to reduction of the mercury, which was, I believe, caused to a great extent by the evaporation of the ether hastening oxidation. So on another batch, made in precisely the same manner, I substituted petroleum ether. The product here was similar in appearance to that obtained with ether, and it was not till after some weeks that I found signs of reduction.

I now resolved to try and combine them by using simply molecular proportions. I had found by previous experience that the more recently the oxide was prepared, the more easily solution was effected, so I precipitated some as before, collected and dried it at as low a temperature and as quickly as possible. It has since been suggested to me by Mr. Naylor, of Messrs. Hearon, Squire and Francis, to wash the collected precipitate, with a little dilute alcohol before drying, which would facilitate these necessities. I have not been able to try it, but should think it well worthy of trial. Of this I took 54 grains, mixed it with 141 grains of pure oleic acid, which should be of a pale straw colour, with no rancid odour (I may here say I have been unsuccessful with samples of acid highly coloured and rancid), and heated it on a water bath, stirring with a pestle, which I found hastened the process, by breaking up the oxide and thus allowing more intimate contact with the acid. No effect seemed to take place for ten minutes, then the oxide was seen gradually to disappear, and in three-quarters of an hour complete solution was effected. The result was a solid of a pale yellow colour, somewhat sticky and tenacious, and which contains theoretically 27·7 per cent. oxide. This can be reduced to the two pharmacopœial strengths as desired. Of course to follow our official guide the diluent would have to be oleic acid; I would rather advocate the use of lanolin, which, owing to the facility with which it is absorbed, would hasten its physiological action more than any other diluent. True, we would not be able, owing to its consistence, to apply it as recommended by Dr. Marshall with a camel's hair brush, but I see no reason why smearing it lightly over the required part with the finger should not be equally successful. It also obviates the reduction the excess of acid is likely to accomplish. I have often heard medical men express their disappointment with the result of this remedy, and they have consequently given up its use, which non-success is due to the reduction generally taking place, as then its rapid absorption by the skin is greatly delayed, and would more nearly approach the ordinary mercurial ointment; to say nothing of its irritating properties. Respecting the actual chemical change referred to previously, I would emphasize the remarks of Drs. Squibb and Tichborne. To see if water really was formed in the reaction, I took 54 grains of oxide and 141 grains of acid, placed them in a tared dish, heated this over a water-bath for half an hour, when it had lost 3 grains in weight. I then increased the temperature by adding salt to the water in the bath and continued the heat, when the oleate was decomposed; the theoretical quantity of water to be driven off was 4½ grains. I took again 108 grains of oxide and 282 grains of acid, heated them as before, and in three-quarters of an hour had driven off 8 grains without reduction occurring. The theoretical quantity would be 9 grains. This loss of water in manufacture would tend to make the preparation slightly stronger than 27·7 per cent. of oxide. Dr. Squbb says the normal oleate of mercury contains 28·4 per cent. of oxide, but he leaves the water out of consideration altogether, therefore I think for all practical purposes it may be taken as 28 per cent. Its keeping properties you can judge for yourselves, the sample before you having been made over eleven months.

Seeing Dr. Shoemaker's record of his preference to the mercur*ous* salt, I resolved to try its manufacture, and possibly the following few notes may not be considered out of place here, as they may be included under the heading I have chosen. I proceeded as before to precipitate the oxide by shaking excess of solution of soda with calomel, washing and drying precipitate. Of this I took 41 grains and of oleic acid 56 grains, according to the equation—

$$Hg_2O + 2HC_{18}H_{33}O_2 = 2HgC_{18}H_{33}O_2 \cdot H_2O.$$

placed them in a dish on a water-bath, when almost immediately the mixture turned to a grey colour, like mild mercurial ointment; so I took similar quantities and allowed them to stand in the cold for some time, when it is interesting to note in half an hour it had solidified to a *green* solid mass, forcibly reminding one in colour of its near relation, the lower iodide of the same base. On standing twenty-four hours it had changed to the grey leaden colour indicative of reduction, which seems to accord with the observations of Dr. Shoemaker.

In conclusion, allow me to thank you for your kind patience, and to hope you may find this method as successful in your hands as I have in my own.

The President (Mr. Ellwood) alluded to the pharmaceutically interesting nature of the paper, and said oleate of mercury was one of those unsatisfactory preparations which commonly caused the dispenser a good deal of disappointment. He had found that oleate of mercury was less liable to change when stored in a stoppered bottle than under the normal conditions. The method of precipitation advocated by Shoemaker yielded an oleate of mercury which was not nearly so satisfactory a product as that obtained by dissolving the oxide in oleic acid, whilst at the

same time it was an infinitely more troublesome process than the latter. He believed the faultiness of the product often lay with the oleic acid, and if freely precipitated oxide was carefully dissolved in pure oleic acid, he believed the evil might be mitigated, even if it could not be altogether removed.

Mr. W. J. Daniels said he was very much interested in the subject, which had occupied some part of his attention for eighteen years. He congratulated Mr. Harrison on the able manner in which he had surmounted the difficulties that attended the preparation of oleate of mercury. In the early days of its introduction it was the custom to use heat, but owing to the liability to change which ensued, he had now for some years employed a cold process which furnished a more stable preparation. The main thing was to use a freshly-precipitated and well-washed oxide and a light-coloured sample of oleic acid.

Mr. E. J. Millard said the paper was useful and valuable as an epitome of the various methods of preparing oleate of mercury. The method suggested by Mr. Harrison did not strike him as particularly original, for a 28 per cent. oleate had been made before, whilst the application of heat was by no means novel. There could be no doubt that the purity of the oleic acid had much to do with the successful preparation of the oleate, and reference had been made to the unsatisfactoriness of dark oleic acid. It must be remembered, however, that depth of colour was not always indicative of impurity, as some dark samples contained higher percentages of free fatty acid than some paler specimens. It was unfortunate that Mr. Harrison had not estimated the oleic acid in his samples, as the presence of notable quantities of hydrocarbon oils or of glycerides would have explained their deficiency. There could be no question, from the manufacturing point of view, that the method of dissolving the oxide in the acid was infinitely better than the precipitation method, which was both tedious and messy. In his experience there were two essentials to the rapid and satisfactory preparation of the oleate. First, that a moderate heat should be employed; secondly, that the oxide, which should be recently precipitated and quite amorphous, should be added gradually to the warm oleic acid. It was doubtful whether the addition of lanolin to the oleate would be an advantage, as it would materially alter the consistency of the product, whilst the absorption might be unpleasantly increased.

Mr. A. C. Stark thought Mr. Harrison's paper showed a good deal of careful work, but he was unable to agree with the conclusions the author had arrived at. It was not at all certain that the method suggested gave a true oleate, and the product certainly differed physically from that made by precipitation. It was remarkable also that all the other oleates should be made by precipitation. Oleate of mercury made by precipitation with sodium oleate, was, he thought, as perfect a preparation of this kind as it was possible to get. It was convenient to dispense, definite in composition, and kept perfectly. The pharmacopœial preparation, on the other hand, contained so much free oleic acid as to be often highly objectionable from a medical point of view, and it was moreover unstable. The precipitation process was of course a far more troublesome and lengthier mode of preparation than that suggested, but he ventured to say that it yielded an infinitely superior result.

Mr. W. L. Williams inquired if the author had conducted a corresponding experiment with the oleic acid, when estimating the amount of water which the typical specimen of oleate of mercury was stated to have lost upon drying. He also suggested that the coloration of dark samples of oleic acid might be due to the formation of oxyoleic acid analogous to the oxylinoleic acid of linseed oil.

Mr. Harrison, in replying, said that he agreed with the remark of the President that samples of oleate of mercury were less likely to decompose when kept in a stoppered bottle. The specimen he showed, however, had been stored in an ordinary loosely covered pot. While claiming no novelty for the suggestions he had made, he thought it was the first time a process had been made public for preparing a neutral oleate of mercury, all those in ordinary use containing a greater or less excess of oleic acid. He admitted that the purity of the acid was a very important point, but had found it made no difference in working on comparatively small quantities whether the oxide was added gradually or not; his own plan was to add the acid direct to the whole of the oxide. Dilution with lanolin had been found satisfactory, but he had made no determination as to the solubility of the oxide in lanolin. He considered the solution of the oxide in the acid by far the best means of obtaining a definite salt, inasmuch as if a definite quantity of an oxide is wholly decomposed by a definite quantity of an acid, chemistry at present teaches us to believe a definite salt is formed, whereas in the precipitation process the neutral oleate (when found so) of the alkali is decomposed by the addition of water, with formation of the alkali, which would tend to give basic salts on adding it to a solution of a mercury salt. He had conducted a control experiment, and had not found the oleic acid to lose weight.

A vote of thanks was accorded to Mr. Harrison for his paper, and the attention of the members was then called to a striking illustration of the action of light upon drugs and chemicals which had been referred to by Mr. W. L. Williams in a short note at the previous meeting. The proceedings then terminated.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

Who is Intended by the Pharmacy Act to be the Seller of Poisons?

A special meeting of this Association to consider the above question was held at the Royal Institution, on Thursday afternoon, November 21.

The President, Mr. A. H. Samuel, F.C.S., who occupied the chair, in opening the meeting said they had been called together to consider a question of the utmost importance to every one connected with the drug trade, and he hoped the matter would be fully discussed by those present. They were, of course, aware that just recently the Council of the Pharmaceutical Society had prosecuted a chemist's assistant for selling a poison, he being unregistered, and that the judge, holding that the person who actually serves the customer is the "seller," fined the defendant £5 and costs, in accordance with the 15th section of the Pharmacy Act. He said that hitherto it had been presumed that the owner of the shop was the seller, and that he only need necessarily be a registered chemist, and the point to be considered was which of these opinions is the correct one. He trusted they would confine themselves to this point. They were not present to consider which reading would prove the more advantageous to the chemist in the future, nor to remark upon the action taken by the Pharmaceutical Society. He then called upon Mr. A. C. Abraham to open the discussion.

Mr. A. C. Abraham, in opening the discussion, explained that personally he was perfectly indifferent as to how this question was decided, but as his name had been publicly mentioned, he gave shortly a few of the reasons which had prompted him to take a certain course at the meeting of the Pharmaceutical Council.

Dr. Symes said he wished in the first place to state

and to emphasize that he had no wish to oppose or to in any way raise opposition to the Pharmaceutical Council. As a representative body it should command the respect and support of the whole body in the performance of its duties. It had been placed in an awkward position, and had taken the course which a majority of its members considered best, and on which they were not called on to pass a vote either of commendation or censure. Some day they might with profit discuss the advantages and disadvantages to the public and themselves of conditions to be embodied in a new Pharmacy Act, but at present that was not the question before them. The question was simply this. Was it the intention of the present Act that only a registered person, be he master or servant, could sell a poison? Or in other words, Who is intended by the Act to be the seller? He went on to explain the two views which were held, designating one the "personal" and the other the "delegate" view, and stated that he had the strongest belief that the Act contemplated the latter. He was prepared to consider and discuss fairly anything which may be said to the contrary, but thought the evidence he should adduce would be very conclusive in support of his view. He then recounted from personal experience and observation the condition of things existing immediately before, during and subsequent to the passing of the Act, pointing out that in those days nine out of ten assistants were unexamined and unregistered. He believed the men of experience actually engaged in the business, who may be regarded as the "fathers in pharmacy," and who constructed the clauses of the Act, never contemplated turning all hese thousands of men out of their situations and depriving them of their livelihood and their masters of their services and so have paralysed the trade, which must have been the case had they intended and acted on that with which they are now accredited. Had such been the case the Act would never have passed. Then there were hundreds of apothecaries selling in open shops or surgeries poisons to the public at the hands of unregistered persons, and clause 16 of the Act specially provided that there should be no interference with the business of any apothecary, and that exemption still existed, and it seemed rather extraordinary to say that in the interest of the public a chemist's assistant, if unregistered, could not legally sell a poison, but that the same man, if employed in an apothecary's shop, may sell as much as he pleases, even though the nature of his master's business is such that it must require him to be absent much of his time and there would be consequently little supervision. This he considered a point deserving their serious consideration, especially in places where there were still shop-keeping apothecaries. He said that the judges who had considered this matter had been by no means unanimous in adopting the "personal" seller view, and those who had done so had merely expressed an opinion (on side issues) that such was the intention of the Act, without considering or even knowing the surroundings at the time of its birth. He then proceeded to consider the Act, pointing out that the preamble contemplated qualification and examination for persons before commencing business, but not for assistants; in fact, the Act nowhere required registration on the part of an assistant, except where he acted for unregistered employers, as in the case of executors carrying on the business of a deceased chemist. Clauses 1 and 15 were those which furnished grounds for entertaining the "personal" seller view, where they stated that no person should sell or keep open shop for selling, or should use certain titles. This was the usual tautology of legal documents and Acts of Parliament, and was intended by the framers (who were their friends) to protect the interests of those who should go into the business. It would, he said, be obviously unfair to separate the words "any person who shall sell" from those following, and say that they mean something else. Could it be that intelligent pharmacists intended to hit at the assistant who should hand over a bottle of medicine to the purchaser and insist that he must be registered, whilst it omitted mention of the dispenser or compounder, who may be the errand boy so far as the Act is concerned? But clause 15 does provide that a penalty of £5 should be incurred by any person who "should compound any medicine of the British Pharmacopœia otherwise than according to the formularies of the said Pharmacopœia." Now as the preparations the dispenser uses are not made by him, but in the laboratory by other persons, assuredly he is not responsible here. Clearly the intention of the Act, according to a rational view, was in his (Dr. Symes's) opinion that the master was the responsible person to the purchaser for the acts of the laboratory assistant, the dispenser and the counter assistant, who should hand over the drug or poison. He said it had been argued that because in clause 17 it stated, "And for the purposes of this section the person on whose behalf any sale is made by any apprentice or servant shall be deemed to be the seller," the proper inference was that in all other sections it was not so; there was, however, no evidence in support of this contention, and it would be just as logical to say that because in the widow's clause it requires the assistant to be registered, the proper inference is that for all other purposes he must not be so. The facts were that this section 17 referred to certain labels, and this paragraph defined clearly whose name was to be on the label; it meant what it said, and it said unmistakably that an apprentice (who would not be a registered person) may sell a poison, and provided the conditions for him to do so. Customers did not look to the assistants as the responsible persons, but to the proprietor; in fact, so far as the public and these sections 1 and 15, which had been so much relied on in support of the "personal" view, were concerned, assistants were not persons; they lost their identity and became factors (important factors, it is true) in the establishment to which they belonged; the public trusted, looked to and exacted from the proprietor, and thus complied with the spirit and letter of the existing Pharmacy Act. Dr. Symes concluding by moving that:—"In the opinion of this meeting the Pharmacy Act does not contemplate or authorize legal interference with assistants employed by and performing duties under the direction of registered masters. That both in spirit and letter it regards the master as the seller, the person responsible to the public and amenable to the law."

Mr. R. Parkinson, in seconding the motion, said that Dr. Symes had dealt with the question very exhaustively, and he quite agreed in the opinion held by Dr. Symes.

Mr. Hocken in supporting the motion said he fully agreed with it, and was very surprised to hear of the prosecution. He said that ever since the passing of the Act, chemists had employed unqualified assistants and considered they were strictly within the law in doing so, and he was still of that opinion.

Mr. J. J. Smith was of opinion that the words "who shall sell" were not intended to be applied to assistants, but to those who might possibly sell poisons without keeping a shop.

Mr. Kirby considered that section 17 clearly defined the seller of the poison to be the owner of the shop and not the employee.

Mr. B. Dickins considered that sections 15 and 17 dealt with two distinct offences—the former with the sale of poisons by unregistered persons, the latter with the necessity for labelling the poison with the name and address of the seller, even though he be qualified

He, however, was quite of opinion that the seller is the owner of the shop, and supported the motion.

Mr. J. S. Ward said Dr. Symes had dealt with the Act from the two points of view, viz., its intention and its meaning. With regard to its intention there could be no doubt. The Act was framed by pharmacists, by those who might be called the fathers of English Pharmacy, men of the highest integrity, and it would be absurd to suppose that these men intended to make it illegal for an unqualified assistant to sell a poison on behalf of his qualified master, because to do so would be to say that they deliberately framed an Act that would be impossible for them or their supporters in the country to comply with, it being impossible at that time to find qualified assistants to carry on their businesses with. When, however, they considered the meaning of the words "any person who shall sell" they were dealing with a subtle question of law—one, the settlement of which would, he thought, involve much expenditure. Personally, he was of opinion that the views held by Dr. Symes were correct, and he should therefore support the motion.

Mr. Burgess said in some cases a customer ordered a medicine containing a poison, asks for it to be sent, and pays the errand boy for it. In such a case who would be the seller? He considered it only right to suppose that in all cases the proprietor of an establishment is legally the seller.

The President now put the motion to the meeting, and it was carried unanimously.

Proposed by Mr. Woodcock, seconded by Mr. Kirby, and unanimously resolved "That a copy of the resolution be forwarded to the Council of the Pharmaceutical Society."

Proposed by Mr. Hocken, seconded by Mr. Parkinson, and unanimously resolved, "That two guineas be given from the funds of this Association towards establishing a fund for the purpose of appealing against the decision of the judge in the recent prosecution."

Proposed by Mr. Woodcock, seconded by Mr. A. C. Abraham, and resolved unanimously, "That it is desirable that a fund be raised amongst the chemists of this city for the purpose of assisting to carry the case to a higher court, and that Mr. Parkinson, the Hon. Treasurer of this Association, be authorized to receive subscriptions."

Dr. Symes promised to subscribe one guinea. Mr. Wellings, on behalf of Messrs. Evans, Son and Co., promised five guineas, and Mr. A. C. Abraham promised a subscription.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The eighth meeting of the session was held in Speed's Hall, 47, Commercial Street, on Thursday evening, November 21, when a lecture was delivered by Mr. W. L. Howie, F.C.S. (Barron, Harveys and Co., London), Mr. Jno. W. Russell, one of the Hon. Vice-Presidents, in the chair. There was a large attendance of ladies and gentlemen, including several chemists from a distance.

The subject of Mr. Howie's lecture was "Ten Days on the Hardanger," and it was illustrated with nearly one hundred dissolving view photographs by the lecturer himself. In the course of a highly interesting and instructive lecture Mr. Howie described very fully the pleasure of a short holiday which he spent in Norway during the summer of 1888. The views shown not only consisted of the magnificent scenery which is to be met with there, but also of various phases of life in Norway. In the latter part of the lecture some very interesting facts were detailed regarding Norwegian pharmacy, and from these it was seen that on the whole the lot of the chemist there is somewhat better than here. The sale of drugs is confined entirely to chemists, and these keep to selling drugs and dispensing prescriptions. In order to become a qualified chemist a three years' apprenticeship has to be served, after which there are two examinations, and before these can be passed the student has to go through a necessary curriculum. The result of this is that the business is in very few hands, but at the same time prices are somewhat less than here. Mr. Howie threw on the screen a splendid photograph of the style in which the pharmacists there send out their goods, and this caused some little amusement to the audience. To see bottles sent out with a long narrow label tied round the neck is rather behind the times, and would astonish the authorities in Great Britain. Different styles of labels are used for the various medicines, and the only adhesive label met with is the poison one, which is attached to all lotions or liniments containing any poison. These labels have the well-known symbol of the skull and cross-bones engraved on them, also the word "Gift," which means poison.

The lecture was attentively listened to and frequently applauded.

At the close a hearty vote of thanks was accorded to Mr. Howie on the motion of the Vice-President, Mr. D. Skinner, and on the motion of Mr. T. C. Henderson a similar compliment was paid to the Chairman.

INVERNESS CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second monthly meeting of the Association was held at their Rooms, 9, Union Street, on Monday evening, November 25, the President, Mr. John Fraser, in the chair.

The minutes of last meeting having been read and adopted, Dr. F. M. McKenzie was called upon to read a paper on "State Medicines, or Prevention Better than Cure," giving a *résumé* of the labours of Jenner, Pasteur and others.

On the motion of Mr. Bethune, Dr. Mackenzie was awarded a hearty vote of thanks for his excellent paper.

A like compliment was paid to Mr. Fraser for presiding.

Before the proceedings terminated, the members and their friends had an opportunity of inspecting the materia medica specimens and chemical apparatus neatly arranged on the tables.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of the session was held in the Mosley Street Café on Wednesday evening, November 27, at a quarter-past eight, Mr. John Pike, President, in the chair. There was a full attendance.

After the usual preliminary business had been transacted, Mr. George Weddell, Hon. President, delivered an interesting address, embodying a general view of science, which we hope to publish on a future occasion.

At the close of the address a vote of thanks, moved by Mr. Pike and seconded by Mr. Clague, was heartily awarded to Mr. Weddell.

Parliamentary and Law Proceedings.

Tinctures and Public Analysts.

At the Stockton-on-Tees Petty Sessions, November 28, Joseph Power, of Victoria Terrace, Stockton, was summoned by the inspector acting under the Sale of Food and Drugs Act for having sold half a pint of tincture of rhubarb, B.P., which according to the certificate of Mr. W. F. K. Stock, the public analyst of

Durham, residing at Darlington, gave "extractive matter 25 per cent. below that yielded by the B.P. tincture." Evidence was given that the tincture was sold as received from a firm of wholesale druggists.

The defence was conducted by Mr. Glaisyer, of the firm of Glaisyer and Porter, solicitors, Birmingham.

Mr. Umney, of Wright, Layman and Umney, Southwark, London, also appeared on behalf of his firm, who were the manufacturers of the tincture. He produced his laboratory journal, and the written instructions of his firm's chemist given to the compounder when the tincture was made in August last.

Mr. Umney stated that each 100 parts by weight gave four and a quarter parts extractive when dried at 212° F. until it ceased to lose weight. He expressed himself strongly on the impossibility of tincture of rhubarb made from a root so variable in its soluble constituents as rhubarb ever yielding a uniform extractive. He gave his own experience of the yield of extract of rhubarb as being between 35 and 55 per cent. when extractum rhei was made from China (East Indian) rhubarb by the official process. He referred to 'Pharmacographia' in corroboration of this, by Hanbury, who found the ash of rhubarb vary as between 13 and 43 per cent.

Eventually the case was dismissed and costs refused.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Society's Council.

Sir,—The severity of competition, the harassings of the law, and the generally inadequate return the pharmacist receives for the responsible nature of his work are causing widespread questionings as to how his grievances may be remedied, and I think it more likely the true interests of the question will be served by ventilation in the pages of our Journal than by seeking, without due thought and discussion, to post-card a new Council into office next May.

If the gentlemen to whom a change in the Council recommends itself would state clearly what they expect to obtain, and not rest content with vague generalities, the question would doubtless be discussed by others with ability and information, and the matter be clearly placed before the electors.

Knowing as I do that the members of the present Council are good pharmacists and practical business men, commanding respect, and keenly anxious to promote the welfare of the trade, men who have devoted time and loving service to forward and elevate it, I do not see much to be gained (except by themselves) in dismissing them; and I doubt very much if fourteen gentlemen can be found to devote for many terms of office their time to our work.

Governments and societies cannot do much with wind and tide against them, the winds of public feeling, and tides of prolonged bad trade; but those sailing in the vessel are loth to make due allowance for its tardy progress owing to hindrances and stress of weather, for which its commander is not responsible.

There seems evidence on every hand of trade revival, and the fairly-equipped pharmacist will stand his chance of good things.

The public are beginning to learn the worth of reliableness in their medicines, and will still support the establishments who maintain that characteristic. Three or four cannot hope to obtain a living where there is only business for one, and the survival of the fittest law may cruelly thin our ranks, a contingency which will call for increasing efforts on behalf of the Benevolent Fund.

But in the meantime the Society, whilst its Council commands the respect of the members and the authorities, is a valuable organization to us, and is ready to work for any redress that is attainable and worthy to seek. It is a grand centre of education, benevolence and social opportunities. It is possible that a few new men of energetic commercial reputation may help forward its councils.

But I think both its President and Council deserve better of the members than the contemplated replacing of the whole of the retiring councillors by fourteen untried men.

Tulse Hill. Wm. Warren.

One per Cent. Solutions.

Sir,—The President of the British Pharmaceutical Conference having invited further remarks on the subject of the 1 per cent. solutions of the Pharmacopœia, I beg to offer the following.

The importance of ensuring accuracy not only in the preparation but in the prescribing and dispensing of the official 1 per cent. liquors cannot be overestimated, particularly as these solutions are those of some of the most potent remedies in the Pharmacopœia, and deviation from accuracy in either of the three operations mentioned above might be attended with serious results.

These so-called 1 per cent. solutions of the Pharmacopœia, with the exception of Fowler's and perhaps the other arsenical solutions, are an essentially British characteristic of medical prescribing, and as such surely the convenience of British prescribers and dispensers should be consulted before all things. The question as to whether the Pharmacopœia of 1885 has done so must have a negative reply, which is all the more intensified by the papers which have been read and the discussions which have taken place on the subject, for which medical men especially should be grateful as well as the pharmacist.

The present pharmacopœial solutions are neither accurate nor convenient; not convenient because they are supposed to contain about 1 grain in 100 fluid grains, which is a measure practically unknown to the prescriber; not accurate if only for the reason that no directions are given to bring to a given volume. This, particularly in the case of liquor strychninæ, where heat is directed to be employed.

From inquiries made of different medical men one learns that by a 1 per cent. solution they imply 1 grain in 100 minims and not 1 grain in 100 fluid grains.

With the solutions of the 1867 Pharmacopœia, where the counterpart of these solutions were of a strength of 1 grain in 120 minims it was an easy matter to calculate the number of minims representative of almost any fraction of a grain; with the present solutions the reverse is the case.

These solutions being prepared for use in the dispensary and not in the laboratory, and the doses, moreover, being minims, not ounces or grains, they should surely be prepared with the relationship of grains to minims unimpaired; the latter measure has been deemed a convenient one to retain, and until it is abolished this relationship should be retained.

That this relationship of grain to minim in these solutions would but little affect foreign pharmacists may be seen by a perusal of the 'Projet d'une Pharmacopée International,' issued by the last Congress at Brussels, in which the well known solutions of strychnine, morphia and the Donovan's find no place, while two only of the arsenical ones are of the strength 1 per cent., the other, liquor sodii arseniatis, having been fixed at 1 in 500.

There can be no possible objection to a strength of 1 in 100 for these solutions, but let the compilers of the next Pharmacopœia make it 1 grain in 100 minims, a measure readily understood by prescribers and dispensers alike, and not omit to give more precise directions as to bringing them to a given volume.

Brighton. E. F. Salmon.

Estimation of Extractive and Specific Gravities of Official Tinctures.

Sir,—Mr. Spilsbury's figures are valueless on the face of them, but Mr. Husband does not improve matters by launching a series of his own, without a word of information as to the conditions under which the tinctures were made.

The truth of the matter is, there can be no such thing as an "average specific gravity," or anything else to identify official tinctures, so long as the Pharmacopœia itself tolerates such crazy methods of preparing them.

Holloway. F. W. Fletcher.

Lime Water.

Sir,—In reference to the paper which appeared in your issue of November 23 on the above subject, it may interest some of those who read it, and possibly others, that in December, 1886, I had a batch consisting of quick lime (? 2 pounds) and distilled water, about 5 gallons, put on and treated as directed in my paper (*Pharm. Journ.*, [3], xiii., 433, upon which the Pharmacopœia data are presumably based).

The lot of lime has now been treated with forty-nine lots of distilled water, and has therefrom yielded 150 to 200 gallons of lime water, each batch of which has been tested and has fully answered the B.P. tests, although at times in hot weather it has only slightly exceeded in strength the Pharmacopœia minimum.

The lime still shows no sign of exhaustion. I venture to predict confidently that if Mr. Ellwood obtains lime water (so called) testing double the Pharmacopœia strength he will find that the excess of alkalinity is due to either magnesia, potash or soda, or all of them, and that no difference will be found between lime water made with quick or slaked lime, for the very simple reason that it cannot be made from the former without the latter being first formed.

I may take this opportunity of saying that some time since a gentleman forwarded to me a sample of solution of soda of about four times the neutralizing power of lime water. This had been obtained as lime water, and is a most scandalous substitution, to which I think attention should be called.

A. C. Abraham.

Sir,—It is quite evident from Mr. T. A. Ellwood's paper that metropolitan lime water is superior to that sold in some parts of the country. I append the results of a number of samples that I procured and analysed about two years ago :

No.	1	contained	9·44	grs. of	CaO per pint.
,,	2	,,	7·22	,,	,,
,,	3	,,	6·10	,,	,,
,,	4	,,	6·6	,,	,,
,,	5	,,	9·16	,,	,,
,,	6	,,	8·32	,,	,,
,,	7	,,	8·8	,,	,,
,,	8	,,	9·72	,,	,,
,,	9	,,	8·05	,,	,,
,,	10	,,	8·2	,,	,,
,,	11	,,	7·66	,,	,,
,,	12	,,	4·72	,,	,,
,,	14	,,	9·22	,,	,,

No. 13, although sold for lime water, was a dilute solution of soda, containing ·540 per cent. of NaHO with only a very slight trace of lime. The result of No. 13 was confirmed by a well known pharmacist.

F. A. Brown.

Aqueous Solution of Carbon Dioxide.

Sir,—I notice that a new chemical theory is being propounded by Mr. Rutherford Hill, in reference to solution of carbonic dioxide in water, but I fear it is a theory which is not supported by facts and which will not stand examination.

Mr. Hill claims that he has established,—

1. That if a solution of carbonic dioxide be boiled, "the CO_2 cannot be entirely removed by boiling."

2. That if "a current of CO_2 is passed through neutral distilled water containing litmus, the blue colour is not restored by boiling," a fact which has not, he says, been noted before.

3. That iron can remain in solution in distilled water in presence of CO_2, and apparently still remain, after the solution has been boiled. These three statements are all put forward in good faith by Mr. Hill, and evidently he expects every other person to accept them in the same frame of verdant innocence as he himself has displayed; but until we have a higher authority vouching for them, I for one respectfully decline to subscribe to the new chemistry. Till that higher authority appears I content myself with affirming :—

I. That from aqueous solutions of CO_2, the carbonic acid gas *can* all be removed by boiling.

II. That if CO_2 be passed into litmus and water till the water becomes acid, the blue colour *can* be restored by boiling, a fact which has been noted before dozens of times, by every tyro in chemistry.

III. That it is difficult to conceive how the water Mr. Hill was experimenting with could have contained iron as well as CO_2, for the moment it was boiled the iron would have been thrown out of solution. I am quite well aware that ferrous bicarbonate is soluble in water, but when such a solution is boiled the iron is thrown down as ferrous carbonate, or ferric oxide, or a mixture of both, and when the liquid is filtered, not the most infinitesimal trace of iron, either ferrous or ferric, can be found.

I confess I am surprised that any man with Mr. Hill's ability should have made such a series of statements, which, to say the least, are hardly scientific.

W. A. Munro.

Notes of a Botanical Ramble in Cornwall and Scilly, etc.

Sir,—In reading Mr. W. Baxter's interesting mems., I thought a few notes of my own when over the same ground on several occasions about twenty years ago might prove interesting to your botanical readers. At that time Mr. Cunnack, the late Postmaster of Helston, was a great authority for localities, and had an excellent herbarium of his own collection. Besides many of the plants mentioned by Mr. Baxter, I found in 1867 near St. Kevern, growing wild very luxuriantly to a height of 4 feet, *Acanthus mollis*, where it appeared to have been naturalized for about fifty years, probably from seeds carried from gardens on the River Fal, or from St. Agnes, Scilly. I have a plant growing still from the locality. *Mentha Pulegium* grew by the wayside, and the beautiful *Hypericum undulatum* in the bogs, and *Alisma ranunculoides* in some water. On nearing the Lizard, one notices the pale yellow buttercup, *Ranunculus hirsutus*, which supplants the other kinds. Suddenly I came upon a hedge covered with *Herniaria glabra* and *Herniaria ciliata*. Where the *Allium sphœrocephalum* grows may be also found a *Thalictrum* among the rocks quite plentiful, and *Inula crithmoides*; *Inula Helenium* grows near St. Kevern. In a valley between the Rill Head and Looe Pool I found the fine *Ranunculus Lingua* and *Carex ampullacea* and a *Statice* (limonium?), etc.

With regard to *Pinguicula grandiflora*, which I found in bogs on the side of Mangerton, one of the highest of the Irish mountains overlooking the Killarney Lakes, where also the *Saxifraga umbrosa* grows, I brought roots of the *Pinguicula*, and kept it alive in my garden in Dublin in water, and it was very remarkable what a profusion of bulbils were found around the edges of the leaves and shed into the saucer as the leaves became old. The plant bore flowers the next year after transplantation. I heard that some Penzance botanist—I believe Mr. Ralf—had planted *Pinguicula grandiflora* somewhere in a bog near.

The dwarf willow—a procumbent plant 6 inches high—also grows in the Lizard district and *Sanguisorba officinalis*. Visiting Jersey this autumn, I found *Rumex sanguineus* in the interior (three specimens), and have since seen it at Launceston. The *Mesembryanthemum*, which I remember so well at Scilly, was growing wild in Jersey, and *Œnothera biennis* was common there. By the way, *Eryngium campestris* still inhabits its old locality near Plymouth—I have never seen it elsewhere—and the three *Erodiums* are now common round the coast. Mr. J. W. N. Keys of Plymouth published some time since a Flora of Devonshire and Cornwall, which is now out of print.

I remember Mr. Cunnack showing me *Erica ciliaris*, but I never found it in the St. Kevern district. I came upon it, however, quite unexpectedly, covering say half an acre of ground, together with *Erica tetralix* and *Erica ciliaris β-Watsonii*, evidently a hybrid between the two, passing from one form to the other by many transitional links, near Truro.

F. P. Balkwill.

Minor.—We are unable to give you any information on the subject more precise than that which is contained in the Regulations of the Board of Examiners, a copy of which may be obtained by application to the Secretary.

T. E. Polley.—The material sent is insufficient for identification.

Errata.—On page 407, col. ii., lines 2 and 5, in the "Note on a Sample of Decomposed Chloroform," for Heat" read "Treat."

Communications, Letters, etc., have been received from Messrs. Harding, Stroud, Bennett, Merck.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 7, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

THE COUNCIL MEETING.

THE last ordinary Council meeting for the present year was attended by twenty members, the only absentee on that occasion being Mr. EVANS. Two persons were elected Associates of the Society, and seven persons were restored to the Register of Chemists and Druggists. The appointment of examiners for England and Wales and for Scotland was then considered, and the previous members of the two Boards were appointed, with the exception of Dr. THRESH, who has gone into the medical profession and become a Medical Officer of Health. In his place Mr. R. H. DAVIES was appointed as the new examiner. A unanimous vote of thanks was passed to Dr. THRESH for the services he has rendered to the Society for many years as an examiner, also offering congratulations on the position he has attained. The report of the Finance Committee recommended further payments to the contractors for the new buildings which are now advancing towards completion, and the purchase of £100 stock for the Benevolent Fund Donation Account, which has been rendered possible by the liberal contribution of £65 by Mr. CHARLES MAW. On the recommendation of the Benevolent Fund Committee four grants of ten pounds and two of five pounds were made. A further grant of five pounds was awarded from the ROBBINS' Fund to an annuitant whose husband had contributed the largest amount to the Benevolent Fund. The Report of the Library, Museum, Laboratory and House Committee recommended in reference to the questions raised at the last Council meeting that the outward carriage only should be paid on books when the distance is more than five miles from Bloomsbury Square, and that the list of books which are always to be found in the Library and are marked in the catalogue with an asterisk should be extended. These recommendations were adopted as being the best arrangement that could be made under existing conditions. The issue of books on loan has increased from about 400 in 1877 to 1709 in 1888, and is still steadily increasing.

Mr. MARSHALL LEIGH, in speaking upon the motion of which he had given notice, with the object of establishing some means of inducing apprentices to commence the requisite studies at an early period, urged that the award of prizes by the Society would be a useful means by which this influence could be brought to bear on the general apathy of apprentices. He suggested that a number of prizes should be offered annually to registered apprentices and that examination of the candidates for them should be conducted in the same way as the Scholarship examinations. By such an arrangement he thought that the great disadvantage resulting from the long lapse of time between the Preliminary and the Minor examination would be counteracted, for while under existing conditions a great many apprentices never thought about study at all until the time arrived for presenting themselves for the qualifying examination, the plan he suggested would have the effect of inducing apprentices to join the Society, and the examinations he proposed to institute would form a series of stepping-stones from the Preliminary to the Minor. Every year during apprenticeship some further preparation would be made for the final ordeal, and meanwhile apprentices would be kept in touch with the Society. In the discussion of Mr. LEIGH'S motion the desirability of the object aimed at by him was generally acknowledged, and it was admitted that the course he proposed might be useful in maintaining a proper relation of apprentices to the Society between the beginning of apprenticeship, when they passed the Preliminary examination, and the time of presenting themselves for the Minor examination. Every speaker testified directly or involuntarily to the sense of the need for greater attention being given to study during the period of apprenticeship, but there seemed to be an equally unanimous feeling that such a result would be best secured by a more unavoidable influence than the offer of prizes. That plan would still leave an option to the apprentice, and it would have but little effect upon the apprentice's master. If, on the other hand, study during apprenticeship were an established obligation for all who contemplate entering the business of pharmacy there would be no alternative for apprentice or master but to regulate their mutual relations in such a way as to satisfy the requirements. Mr. LEIGH'S proposition appears in fact to acknowledge the justice of all the arguments that are put forward for a definite curriculum; it admits the existence of all the evils which a curriculum is intended to do away with, and so far as the reason for establishing one or other system is concerned the two projects appear to be identical. The only difference is that instead of making the obligation of study unavoidable, Mr. LEIGH would only go half way and trust to the stimulus and sense of

rivalry that might be evoked by the incentive of prizes. The prevailing feeling of the members of Council was decidedly in favour of the system that would be more certain to be effective, and though fully appreciating the good motive of Mr. LEIGH'S suggestion, they did not manifest any disposition to trust to less stringent influences. On the contrary it seemed to be generally recognized that for the promotion of pharmaceutical education, success could not be hoped for from anything but a compulsory system. However, the motion was eventually referred generally to the Library Committee for consideration and to be reported upon to the Council.

The motion of which Mr. HAMPSON had given notice in reference to the drafting of a Pharmacy Act Amendment Bill raised the question whether that Bill should be confined as heretofore to the matter of pharmaceutical education, or whether it should not also comprise provisions calculated to render the Act of 1868 a more complete enactment to embody the principle laid down in the preamble of that Act. The scheme of a curriculum was, however, the first and leading feature of the Bill contemplated by Mr. HAMPSON as being desirable, and he declared that he considered that to be the keystone of any legislation for pharmacy. The supplementary features of the proposed Bill included provisions for giving associates in business greater privileges as members of the Society, for establishing one title for all registered persons practising pharmacy, and for making membership of the Society a necessary result of passing the qualifying examination. These propositions naturally gave rise to considerable discussion, to the report of which we must refer, but it was decided to instruct the Law and Parliamentary Committee to consider the matter and report to the Council. Two other subjects were also referred to this Committee, viz., that of the Medicine Stamp Acts, consequent upon the presentation to the Council of the memorial from Newcastle, to which reference was made in this Journal two weeks since, and that of medicated wines. A letter from Dr. QUAIN, the Chairman of the Pharmacopœia Committee of the General Medical Council, addressed to the President of the Society, announced the decision to publish an addendum to the Pharmacopœia, and requested the advice and assistance of the Council of the Society as to the arrangements by which, in the execution of that work, matters of practical pharmacy are to be provided for.

An Evening Meeting of the Pharmaceutical Society will be held at 17, Bloomsbury Square, W.C., on Wednesday next, the 11th inst., when a series of papers on *Scopolia carniolica* will be read, arising out of an investigation that has been carried on in the Research Laboratory. An introductory paper by Professor Dunstan will be followed by one on the Chemistry of *Scopolia carniolica*, by Professor Dunstan and Mr. A. E. Chaston; Mr. F. Ransom will contribute a paper on the Pharmacy of the drug, and Mr. E. M. Holmes one on its Natural History; Mr. Greenish will compare the Histological Characters of the Rhizome with those of the Root of *Atropa Belladonna*; and Sir Dyce Duckworth will communicate some Observations on the Therapeutic Action of *Scopolia carniolica*. In addition there will be a paper on "The Root Bark of Euonymus (Wahoo) and Euonymin," by Messrs. W. A. H. Naylor and E. M. Chaplin, and some "Notes on Calamine," by Mr. W. M. Holmes. The chair will be taken at eight o'clock, but, as usual, the theatre will be open for an hour previously, to afford an opportunity for the inspection of specimens and apparatus that may be exhibited.

* * *

A fortnight since it was noticed in these columns that a decision had been given in Ontario as to the meaning of the word "sells" in the provincial Pharmacy Act, which was quite in accord with the recent decision of the Judge of the County Court at Wandsworth. We now learn that in Melbourne a very similar case was about two months since decided in the same way. A qualified pharmaceutical chemist opened a branch establishment and placed an unqualified assistant in charge. Against this assistant proceedings were taken by Mr. Shillinglaw, Registrar to the Pharmacy Board of Victoria, for a breach of the Colonial Pharmacy Act by selling some laudanum. The defendant pleaded guilty, and the magistrate, after remarking that there could be no doubt a breach of the Act had been committed, inflicted a fine of £2 2*s*. 0*d*., with £3 3*s*. 0*d*. costs.

* * *

We understand that notice has been given of appeal against the decision of Judge Holroyd, and that a motion will be made in the Queen's Bench Division of the High Court of Justice on Wednesday, the 11th inst., or as soon after as possible, for an order that the judgment should be set aside.

* * *

In reference to the prosecution at Stockton-on-Tees, reported in last week's Journal, we notice that in the local newspapers the defendant is described as a "chemist and druggist," although his name is not to be found in the Register of Chemists and Druggists. It is the more necessary to mention this fact, since that erroneous description of the defendant has been the means of misleading another journal.

* * *

In accordance with announcement the recent judicial decision as to the seller of a poison was brought under the consideration of the Chemists' Assistants' Association on Thursday evening, but the discussion was eventually adjourned to a special meeting of the Association to be held on Tuesday next. The next ordinary meeting will be held on Thursday, December 12, when a paper on "Herbaria" will be read by Mr. G. C. Druce.

* * *

The next meeting of the School of Pharmacy Students' Association will take place on Thursday, December 12, when a paper will be read on Titanium and its Salts, by Messrs. A. J. Simons and A. O. Scrivener, and a Report on Botany will be given by Mr. R. H. Norman.

Transactions of the Pharmaceutical Society.

MEETING OF THE COUNCIL.

Wednesday, December 4, 1889.

Present—

MR. MICHAEL CARTEIGHE, PRESIDENT.

MR. ALEXANDER BOTTLE, VICE-PRESIDENT.

Messrs. Abraham, Allen, Atkins, Cross, Gostling, Greenish, Hampson, Harrison, Hills, Leigh, Martin, Martindale, Newsholme, Richardson, Robbins, Schacht, Southall and Watt.

The minutes of the last meeting were read and confirmed.

Election of Associates.

The following, having passed the Minor examination and paid (as Apprentices or Students) their subscriptions for the current year, were elected "Associates" of the Society:—

Bate, Walter Humphries .....London.
Galloway, Philip Henry.....London.
Taylor, Joseph.....Manchester.

Restorations to the Register.

The names of the following persons, who have severally made the required declarations and paid a fine of one guinea, were restored to the Register of Chemists and Druggists:—

William Braithwaite Brown, 6, West Street, Fleetwood.
Albert Clarkson, 43, High Street, Stockton-on-Tees.
Frederick Craven, Horsefair, Pontefract.
George Henry Hanson, 73, Bartholomew Street, Newbury.
Benjamin Henry Haworth, 37, Portman Street, Moss Side, Manchester.
Joseph Richard Henchley, Edgware, Middlesex.
Albert Hall Morgan, 56, Commercial Street, Hereford.

Appointment of Examiners.

The Council went into committee to consider the appointment of pharmaceutical chemists as members of the Boards of Examiners.

On resuming the following were appointed:—

Board of Examiners for England and Wales.

Blunt, Thomas Porter, Wyle Cop, Shrewsbury.
Bowen, John William, 13, Curzon Street, Mayfair, W.
Corder, Octavius, 31, London Street, Norwich.
Davies, Robert Higgins, Apothecaries' Hall, E.C.
Druce, George Claridge, 118, High Street, Oxford.
Fletcher, John, 12, Montpellier Avenue, Cheltenham.
Gale, Samuel, 225, Oxford Street, W.
Gerrard, Alfred William, University College Hospital, W.C.
Greenish, Thomas Edward, 5, Bathurst Street, Sussex Square, W.
Ransom, Francis, Fairfield, Hitchin.
Saul, John Edward, 143, New Bond Street, W.
Symons, Wm. Henry, 130, Fellowes Road, South Hampstead, N.W.
Tanner, Alfred Edward, High Cross, Tottenham, N.
Taylor, George Spratt, 13, Queen's Terrace, St. John's Wood, N.W.

Board of Examiners for Scotland.

Clark, Wm. Inglis, 104, South Canongate, Edinburgh.
Dott, David Brown, 104, South Canongate, Edinburgh.
Gibson, Adam, Thistle Street Lane East, Edinburgh.
Gilmour, William, 11, Elm Row, Edinburgh.
Kinninmont, Alex., 69, South Portland Street, Glasgow.
Maben, Thomas, 5, Oliver Place, Hawick.
Nesbit, John, 162, High Street, Portobello.
Stephenson, John B., 48, Frederick Street, Edinburgh.

A vote of thanks was unanimously passed to each member of the Boards of Examiners in England and Wales and in Scotland for their services during the past year.

Vote of Thanks to Dr. Thresh.

The PRESIDENT then moved a special resolution of thanks to Dr. Thresh for the services he had rendered for eight and a half years as a member of the Board of Examiners for England and Wales. Most of those present knew Dr. Thresh personally, and it was not necessary therefore to say much in commendation of this resolution. It was perhaps a source of regret, in some respects, that so many of their best men should get promoted to a different—he would not say a higher—sphere, for he thought as good work could be done in pharmacy as in medicine if a man were actuated by noble motives. By the accidents of life Dr. Thresh had thought fit to go into the medical profession and practice in the special department known as sanitary medicine, and the members of Council, while expressing their thanks to him and regret at losing his services, could not but feel that an eminent member of their body, who had by efforts of the greatest individuality raised himself to be an intellectual giant, was to be congratulated on the fact that his talents had been appreciated, and that he had been appointed to the important post of Medical Officer of Health for Essex. He remembered with great pleasure the fact that he (the President) had nominated Dr. Thresh as a member of the Board of Examiners, and how enthusiastically Mr. Radley then spoke in his favour; and it had been a source of great satisfaction to him to be associated with him. Dr. Thresh had not only rendered signal service as an Examiner, but had been an active officer of the Conference, and generally had thrown himself into the official work of pharmacy with a great deal of zeal. He hoped that Dr. Thresh, even though he ceased to be a member of the Society, would still retain his interest in it, and he would no doubt have many opportunities of being of service.

The VICE-PRESIDENT having cordially seconded the motion and endorsed the remarks which had been made by the President,

Mr. GOSTLING supported it. He said he had watched with much pleasure and interest the progress of Dr. Thresh, from the time of his becoming a Bachelor of Science up to the present, and while regretting that Dr. Thresh had left the ranks of the Society, he was sure they would all congratulate him on the position he had now attained.

The motion was carried unanimously.

Meetings of Boards of Examiners in 1890.

It was resolved that the Board of Examiners in England and Wales should meet in February, April, June, July, October and December. The Board for Scotland to meet in the month of January, April, July and October.

Reports of Committees.

FINANCE.

The report of this Committee included a recommendation that the usual monthly and current accounts be paid; also that a sum not exceeding £1500 be paid to the contractors for the new building during the month of December, on the certificate of the architect. It also recommended the purchase of £100 stock on the Benevolent Fund Donation Account.

The PRESIDENT in moving the adoption of the report said there was nothing special to refer to, except in connection with the Benevolent Fund. Last month,

he referred to the donation account, and expressed the hope that some friends would come forward with donations to such an extent that it might become possible to invest £100 before the end of the year, and he was glad to say that Mr. Charles Maw had kindly sent a cheque for £65, which would enable the Council to do so, and which made up the sum contributed by Mr. Maw to the Fund to 300 guineas. He would not say anything more about it, as Mr. Maw was one of those charitable gentlemen who liked to keep his good deeds as quiet as possible; but they all appreciated his kindness and the confidence which he showed in the conscientious care with which this fund was administered by the Council for the benefit of the whole trade, and would agree in sending him an informal vote of thanks for his beneficent gift.

The motion was seconded and carried unanimously.

BENEVOLENT FUND.

The report of this Committee included a recommendation of the following grants:—

£10 to the widow (aged 41) of a member from 1867 to 1870 and a subscriber for the same period. Three previous grants have been made; applicant is still a confirmed invalid. (London.)

£5 to a registered chemist and druggist (aged 54), who has failed in business, is in bad health, and has no resources. (Warwickshire.)

£10 to a registered chemist and druggist (aged 63), who has had fourteen previous grants, amounting to £110, and her health being entirely broken down is quite dependent on benevolent aid. (Edinburgh.)

£10 to the widow of a registered chemist and druggist (aged 44). Applicant has four children, but only one is dependent on her, and she is in very delicate health. (London.)

£10 to a registered chemist and druggist (aged 59); this was a case which had been deferred in October and November for fuller information. (Durham.)

£5 to a former apprentice and associate (aged 34). Applicant recently bought a small business, but it proved unsuccessful. He is now out of employment. (London.)

One case had been deferred for further information.

The Robbins' Fund.

The Committee recommended that £5 be given to Mrs. Caroline C. Davies from this fund, her late husband having contributed £13 13*s.* to the Benevolent Fund.

The VICE-PRESIDENT, in moving the adoption of the report, gave some particulars with regard to one of the cases relieved. The President had taken out of his hands the opportunity of saying anything about the liberality of Mr. Maw, and he had nothing to add except to thank Mr. Maw for the great consideration he had always shown for the wants of his poorer friends in the trade.

The motion for the adoption of the Report was then agreed to unanimously.

LIBRARY, MUSEUM, LABORATORY AND HOUSE.

Library.

The report of the Librarian had been received, including the following particulars:—

	Attendance.	Total.	Highest.	Lowest.	Average.
October	Day . .	772	41	6	29
	Evening .	192	16	3	8

Circulation of books.	Town.	Country.	Total.	Carriage paid.
October. . .	116	175	341	£2 4 9½

The undermentioned donations to the Library had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

For the Library in London—

Owens College, Calendar, 1889.
From the COLLEGE.

Mason Science College, Calendar, 1889.
From the COLLEGE.

Royal College of Surgeons of England, Calendar, 1889. From the COLLEGE.

U. S., Surgeon-General's Office, Index-Catalogue of Library, vol. 10. From the SURGEON-GENERAL.

U. S., Department of Agriculture, Division of Chemistry, Bulletin nos. 13 (part 5), 22 and 23.
From the DEPARTMENT.

Digest of Criticisms on the United States Pharmacopœia, 1880, part 2.
From the CHAIRMAN OF THE COMMITTEE OF REVISION AND PUBLICATION.

Memoirs for a Natural History of Animals, 1701.
From Mr. RICHARD WILLATS.

Jürgens (B.), Vergleichende microscopisch-pharmacognostische Untersuchungen einiger officinellen Blätter, 1889.
From Professor DRAGENDORFF.

Flückiger (F. A.), Bestimmung des Morphingehaltes des Opiums, 1889.

— Jalape und Jalapenharz, 1889.
From the AUTHOR.

The Committee recommended that the undermentioned books be purchased:—

For the Library in London—

Wallace, Darwinism, 1889.

Huxley and Martin, Practical Biology, 1889.

Marshall and Hurst, Practical Zoology, 1888.

Wanklyn, Tea, Coffee and Cocoa Analysis, 1874.

Squire, Companion to the British Pharmacopœia, 15th ed., 2 *copies.*

Kobert, Historische Studien aus dem pharmakologischen Institute der Kaiserlichen Universität Dorpat, 1889, No. 1, *and continuation.*

Museum.

The Curator's report had been received, and included the following particulars:—

	Attendance.	Total.	Highest	Lowest.	Average.
October	Morning	680	37	8	21
	Evening	108	10	1	4

The following donations to the Museum had been received, and the Committee recommended that the usual letter of thanks be sent to the respective donors:—

Specimens of Form-aldehyd, Para-formaldehyd, Oxymethyl-sulphuric Acid and its Potassium, Ammonium and Barium Salts.
From Messrs. MERCKLIN and LÖSCKANN, Hanover.

Specimens of five varieties of Commercial Tragacanth. From Mr. J. COLLINS.

Fine Specimens of Uranium Ore from the New Uranium Lode in Cornwall.
From Messrs. E. C. BENNETT AND CO.

Specimens of Galena, Tin Ore and Spathic Iron Ore and Blende and Copper Ore from Cornwall; Magnetic Iron Ore and Arsenical Ore from Devonshire; Silver Lead Ore from Cardiganshire; Rutile, Apatite, and Cobalt and Nickel Ore from Norway. From Messrs. E. C. BENNETT AND CO.

Specimen of Oil of Cubebs and of genuine Cubebs from Java. From Professor VAN EEDEN, Haarlem.

Specimens of West African Drugs, including Agbana, Ahay, Ayra, Cotopar, Dedee, Gbaclalar, Gbeyrihigbe, Rhinor, Toray-Toray and Zaclam roots, and the fruit and seeds of *Kickxia africana.* From Dr. PAPEFIO, Accra.

"Guaap" stems (*Trichocaulon sp.*) from Bechuanaland.
From Messrs. HEARON, SQUIRE and FRANCIS.

Specimen of Red Oil of Cajeput.
From Mr. U. WYATT.

A series of Micro-slides of *Scopolia japonica* and *S. carniolica.*
From Mr. J. HART, F.C.S., Manchester.

The Committee had considered the questions raised at the last Council meeting as to the administration of the Library, and found that the country circulation of books had increased from about 400 in 1877 to 1347 in 1880, when a new catalogue was issued, and in 1888 the issue reached a total of 1709. It was recommended that in all cases the carriage outward of books should be paid by the Society where the distance is more than five miles from Bloomsbury Square, but that carriage both ways should not be paid. It was also decided that the President should revise the list of books marked with an asterisk, as indicating that books so marked are always to be found in the Library.

It was recommended that 850 Calendars and 1650 Registers for 1890 be printed by Messrs. Butler and Tanner.

The application from the Dundee Chemists' Assistants' Association for assistance in forming a library and museum had been deferred to the next meeting.

The staff of the Society's School had attended and reported on their respective classes.

The PRESIDENT moved the adoption of the report and recommendations. In doing so he said the chief point in it was the detailed consideration which had been given to the Library regulations, from which Mr. Newsholme would gather that the Committee did not see its way to accept his suggestion. He need not go into all the details, and would only add that certain arrangements were proposed which he thought would conduce to the usefulness of the Library. The question of the mode of appointing Local Secretaries had been discussed, and would be again discussed next week, when he hoped a report would be prepared on the subject. The circulation of books it would be seen had enormously increased under the recent regulations, and was still steadily increasing.

Mr. ABRAHAM thought it would be a mistake to pay the carriage of books outward only, because many people had contracts for carriage from London to the provinces, but very few had contracts from the provinces back to London; so that those who had hitherto had their books free would now have to pay.

The PRESIDENT said the Society had contracts also, and could not make contracts for the return carriage. There were other considerations which made the Committee think if the members at large did not strongly object to it, that this arrangement would on the whole work well. Members in the country would be better able to select cheap methods of carriage for return than the Society.

Mr. NEWSHOLME said if he had known how large the circulation of books was he should not have brought forward the matter as he did. Of course he bowed to the opinion of the Committee, though he was still of opinion that there were a few young men in the country to whom it might be an advantage to have the carriage paid both ways; but perhaps an exception might be made in special cases. He should be quite willing to leave the matter as it was at present.

The motion for the adoption of the report was then unanimously agreed to.

DEATH OF AN ANNUITANT.

The Secretary reported the death, on November 15, at the age of 80, of Mr. John Rogers, an annuitant, who was elected in 1867.

WITHDRAWAL OF A NOTICE OF MOTION.

Mr. SCHACHT said he had ascertained, since handing in a notice of motion on the matter of the Pharmaceutical Society *v.* Wheeldon, that an appeal had been lodged, and as the case was still *sub judice*, he begged leave to withdraw the notice of motion.

PRIZES FOR STUDENTS.

Mr. LEIGH then moved the following resolution, of which he had given notice:—

> "That in order to encourage youths to study during their apprenticeship, a number of book prizes and certificates should be offered by the Pharmaceutical Society, to be competed for annually by the registered apprentices of the Society; and that the Library, Museum, Laboratory and House Committee be requested to report on the best method of carrying out this proposal."

He said when he saw so many gentlemen present who had given the best thoughts of many years to the question of pharmaceutical education, he felt that perhaps an apology was due from him, as one of the youngest members, for bringing forward this motion. But his excuse was that it seemed such a short period ago when he was an apprentice himself, and in his own person experienced the inconveniences and hardships which attended the lot of an apprentice in a small third-rate town. In order that this subject might be more fully understood he had prepared and sent round a few notes explanatory of the proposal, which would save him referring to them in detail. A proposal similar to this had already been before the Council some years ago on the suggestion of Mr. Martin, who was not then a member of the Council, in the direction of giving prizes to registered apprentices, but that was confined to apprentices attending classes at the various schools in connection with provincial associations. Mr. Martin's suggestion was that these prizes should be offered to all the registered students of the Society. He thought the reason the former suggestion had not been adopted was, that the provincial societies, or their schools, had dwindled down and almost disappeared, so that it seemed hardly worth while to carry out the suggestion; but all would agree that provincial pharmaceutical education was in a very unsatisfactory state, as was shown partly by the condition of the schools and the few pupils attending them. This was also shown by the fact that under 40 per cent. of the candidates for the Minor succeeded in passing at the first attempt. Within his own recollection, there had been something like a dozen schemes promulgated by leaders in pharmacy, but they had all ended in nothing; they had all been doomed to failure, and all such schemes were doomed so long as they did not recognize the fact that the co-operation of the apprentices themselves was absolutely necessary to success, and that this scheme was intended to secure. Apprentices had a great deal to discourage them, and if the Council could only bring some influence to bear which would counteract those discouragements, it would do a great deal of good. The great mass of apprentices neglected study; perhaps 5 per cent. followed it from a pure love of knowledge; but one reason why they neglected it was that they did not see its immediate necessity. Pharmaceutical legislators had put two barriers in the way of a young man starting in business. First, the Preliminary examination, which he passed about the time he entered on his apprenticeship, and secondly, the Minor, and the long distance between these two tended to make the apprentice postpone his studies for the Minor. That was one great drawback to the regulation which prevented this examination being passed under twenty-one years of age. He would have a greater number of smaller examinations, so as to keep the lad steadily at work during the whole of his apprenticeship. The great difficulty was to raise apprentices out of their apathy and make them do things they would not do themselves, and if the Council could by offering them some little inducement bring some incentive before them it would be doing a very good work. The only way to make

apprentices study was to appeal to their strongest motives, and amongst the young men after all the strongest desire was the love of rivalry—the desire for approbation and praise. If these prizes were offered they would appeal to the strongest incentive in human nature. He would also say that to those youths who did not feel that stimulus or the sense of rivalry the examinations would be practically useful as giving a sort of hall-mark to them when they were out of their time, for if an apprentice could prove to a prospective master that he had obtained two or three certificates or prizes during his apprenticeship he would be entitled to a better situation and salary than he would otherwise receive. A great many apprentices never thought about study at all, but they did think about what sort of situation they would have to seek when out of their time; and this incentive would have a great influence upon them. His suggestions were these: First, that a number of books or prizes should be offered annually by the Pharmaceutical Society to these registered apprentices. This would tend to bring in apprentice subscribers, and it would get youths to pass the Preliminary before their apprenticeship, The prizes to be awarded on an examination in writing, conducted in the same way and at the same time as the Jacob Bell Scholarship examination, so that the machinery already in existence could be used and the additional expense would be very small. It was just as easy for a local secretary to superintend a dozen youths as two. The examinations to be open to all registered apprentices who had served not more than twelve, twenty-four or thirty-six months at the time of the examination, so that all would compete with others at about their own age and experience. Absolute equality was impossible, but relative equality would be secured. Three sets of examination papers, suitable to youths in the first, second and third years, should be prepared, and prizes of books value one guinea, and certificates, should be given to all attaining a certain standard of efficiency and merit, so that if a large number sent up very superior papers a larger number of prizes could be given, and the competitors would feel that if they honestly did their best they would not necessarily be displaced by those having better opportunities. If ten or fourteen prizes and the same number of certificates were awarded to each group of examinations there would be about thirty-six prizes annually, and the same number of certificates. A course of study as a guide to the students should be indicated a year in advance, to include pharmacy, a knowledge of the Pharmacopœia, the translation of prescriptions, elementary chemistry, materia medica, and botany. Some youths did not need a stimulus, but all would be the better for guidance, and the hints to apprentices given by the Society, though very good, were not definite enough for the purpose of these examinations. These would form a series of stepping-stones from the Preliminary to the Minor examination, and every year during his apprenticeship the youth would be preparing for an examination. The syllabus which he had circulated gave a definite amount of work for each year, so regulated that it passed from the simplest to the more difficult. This would give an apprentice something to work for. As a rule an apprentice commenced in a very ambitious way, anxious to get on, but the thought that he had six or seven years before he could go in for the Minor was sufficient to keep him from study. Under this scheme he would obtain regular progressive training. He had been asked how many students would be expected to go in for such examinations. He thought there was something like 3000 apprentices in the trade. Some years ago Mr. Bremridge estimated that 1000 entered every year, and last year 1500 students went in for the Preliminary. That 3000 afforded a very large field from which candidates would be obtained. Something also might be deduced from the number of candidates for the Jacob Bell Scholarship, about thirty of whom usually entered, being an average of about ten for each prize, but these prizes only attracted a very few men of exceptional opportunities and abilities. The *Chemist and Druggist* offered two prizes for analytical work every month of the value of 10*s.* 6*d.* and 5*s.*; and as a rule there were 35 to 40 candidates for those prizes. But these had not the prestige and dignity connected with them that prizes offered by the Society would have. The lowest estimate he could make of the number entering would be 10 for each centre, making about 600 in all. He had also been asked about the cost, which he should say would be small, because the machinery already in existence could be used, and the extra cost of prizes would probably be some £50 or £60, which he should expect would come back again in subscriptions. A celebrated German once said the English did everything by racing, and there was a good deal of truth in that, but the offering of these prizes would give greater definiteness to study. A great deal of the reading of apprentices was desultory and practically useless. The examinations themselves would be something more than a test of superiority. They would be a help to study and give the student an opportunity of knowing how far he had progressed. Then he had been asked whether it was right to ask the Society to undertake this, but no one else could do it. The local prizes were very good in their way, but they did not carry sufficient weight with them. During the whole life of the Society its watchword had been education. This was the great object and aim of the founders, and perhaps no other public body had done so much for education. The offering of these prizes therefore would be legitimately carrying out the intentions of the founders, and he thought no more useful work could be undertaken than directing and stimulating the energies of the young. Of course, perfection could not be expected at first, but he should expect to find a good deal of steady improvement in the quality of the candidates presenting themselves for the Minor examination. In conclusion he would say that he had not circulated these suggestions outside the members of the Council, nor had he asked anyone to second the motion.

The PRESIDENT suggested that the wording should be somewhat modified, so as to read that the question of the desirability of offering book prizes and certificates for annual competition to registered apprentices of the Society be referred to the Library Committee for consideration and report. As the motion stood, it rather indicated that the thing was to be done, and the Committee were simply to say how it should be arranged.

Mr. LEIGH said he was quite willing to fall in with the President's suggestion.

Mr. WATT seconded the motion.

Mr. SCHACHT thought Mr. Leigh had spotted a defect in the system, or rather emphasized it, namely, that between the beginning of apprenticeship and the Minor examination, the Society somewhat lost touch of the young men. There was a great deal to be said in favour of sending this subject to a Committee for further elucidation; but he should much prefer the motion if it left out the word "prizes." The Society owed something to the apprentices, and it would be a wise thing if the Committee saw its way to recommend the institution of these annual examinations, so as to draw these young men a little more closely to the Society; but he should deprecate the multiplication of prizes. He thought the cause of study had been somewhat damaged by giving too many material inducements—that it would be more in accordance with what the Council owed to these young men if it limited its supervision to something like a

periodical testing by examination—the certificates to be given to those who passed a certain standard. It would be a matter of considerable interest and pleasure to have to distribute hundreds of certificates of this kind if they were deserved, but he could not contemplate with equal gratification the giving of hundreds of prizes.

Mr. ATKINS was scarcely prepared to agree entirely with the suggestion of Mr. Leigh, though his motive was undoubtedly good, and the idea in his mind was deserving of recognition. There was a deal in it which he most heartily approved, and he thanked him for calling attention to the fact that there was a loss of touch between the point of the Preliminary examination and the Minor. He remembered perfectly well a remark of Professor Michael Foster, in his inaugural address a year or two ago, when talking about examinations he said he would remove the difficulty by examining more, that he would be constantly examining himself as a teacher, and also keeping the young men practised in examinations. His own idea, however, was that it would be better to let this question rest until the educational scheme had been passed. There would then be a motive power, which at present did not exist. There was another point on which he wanted to have all doubt removed, and that was whether it would not be better to recognize not so much the individual student as the local association. He was very anxious, notwithstanding the repeated failures in the shape of provincial associations, which every one must admit, though there were a few doing splendid work, that they should be put in a more flourishing condition, but he believed that would not take place until the great scheme of education now before the country obtained legislative sanction, so that some amount of compulsion might be introduced. Pharmacists had always treated compulsion as a *bête noire*, but it would have to be faced. The great difficulty was to get young men to face the problem of study; a small percentage did it for the love of it, but the great majority did not, and would not until the millennium came, and, therefore, some pressure must be brought to bear upon them. With regard to the question of prizes Mr. Schacht might be right, of which he was not quite sure. He also deprecated the multiplication of prizes; but they had not to appeal to very high philosophical sentiments that ought to animate the human breast, but to take human nature as they found it, and he found that lads were exceptionally fond of possessing elegantly bound books with the endorsement of a university, college, or some other examining body. Still, if Mr. Leigh's scheme were introduced he thought it would cost a great deal more than the sum he had mentioned, and he did not think the Society could at present stand such a strain upon its resources.

Mr. HAMPSON thought Mr. Leigh's purpose would be served if he would leave the matter to be dealt with by the Committee in the thoughtful manner in which he had dealt with it himself. There was much to be said in favour of the motion, but it required a considerable amount of thought, and he certainly could not vote for it at present, though possibly he might be able to do so after further reflection.

Mr. ATKINS wished to throw out an idea for the consideration of the Committee, which he had mentioned recently at Sheffield, and that was that he should be glad if the Society could see its way to giving a prize to successful students in the country in addition to the local prizes they obtained. He found that idea warmly received at Sheffield, and he was sure the successful students would feel it a great addition to the honours they obtained.

Mr. WATT said no doubt the Committee would thoroughly thresh out this question, and they must all admire the benevolent and kindly manner in which Mr. Leigh had brought it forward. But he was rather startled with the magnitude of the scheme proposed, and thought the expense to the Society had been greatly underestimated. If there were 3000 apprentices to prepare papers for, assuming that even half of them took advantage of them, it would cost something like £1000, and he hoped this point of view would be seriously considered by the Committee.

Mr. ALLEN said Mr. Leigh's consent to modify the motion had considerably cleared the ground, and there was very little room left for discussion. He should be happy to share in considering the matter in Committee, and Mr. Leigh had put forward strong arguments as to the advisability of instituting prizes and certificates for the apprentices. He thought Mr. Watt was a little in error in speaking of 3000 apprentices. That referred to the whole number in the United Kingdom, but Mr. Leigh referred to the registered apprentices. They were about 1000, and one great argument in favour of the scheme was that if it were to succeed it would be the means of drawing apprentices into the Society, because all the 3000 men, if they wished to compete, must be registered. This, therefore, would be a source of income to meet the expenditure involved. He should not like the statement to go uncontroverted that there was no particular inducement for apprentices to study. There were plenty who were studying for the Bell Scholarships, and Mr. Leigh was also a little in error in saying that only the very best men came forward for these prizes. No doubt the very best men got them, but there were many ordinary men working away with the idea of going in for them. These, of course, were prizes of considerable value. There were four of them: the two Bell Scholarships, the Redwood Scholarship, and the Herbarium Prize; and it seemed to him that a small modification of the existing arrangements might achieve the end desired. At almost every annual meeting the examiners reported that besides the two gentlemen who actually gained the scholarship so many more had shown themselves qualified for receiving it; and possibly these men might have a certificate or perhaps a prize given to them. But all this was matter of detail, which the Committee could sift out.

Mr. SOUTHALL agreed very much with what Mr. Leigh had said about the difficulty of persuading apprentices to study. It was a thing they had been trying at ever since the Society started, and, so far, they had been extremely unsuccessful. The Bell and Redwood prizes were really worth competing for, being worth from £60 to £80; but, considering their value, there were very few men who took the trouble to study for them. So that he was afraid that these small prizes of books would not be sufficient to dazzle the eyes of many of the apprentices, and that not much was to be done except in the way of compulsion. When that was introduced it would be necessary to have schools where the requisite education could be obtained, and more inducement to seek for it; but at present a young man, after working hard all day in the shop, did not feel inclined to sit down and study without help in the shape of a class or something of that sort.

Mr. MARTIN said he was entirely in sympathy with Mr. Leigh's object, having brought forward a similar proposal in 1885, but he hardly thought the experience of offering inducements to apprentices in the country to study had been so great as to warrant the Council in supposing that this effort would be any more successful. If young men did not recognize the immediate necessity of studying for the sake of the knowledge of their business they would gain, he doubted very much whether any large proportion would recognize that necessity for the sake of a prize or certificate. He was rather against the principle of inducing men to do this, that or the other

by offering them a bribe, and that seemed to be at the foundation of this scheme, though if young men did not see that there were privileges to be won by hard work and devotion to their calling he did not think that the cutting up of these prizes into smaller portions was the proper thing to do. He did not agree with Mr. Atkins's suggestion about giving additional prizes to successful candidates in local associations. Did he mean that the man who got a prize in a provincial school should also be given a book or prize by the Society? If so, were the questions and answers to be sent up there to be estimated by the examiners. Because if that were not done the prize would be of very little value, as the examinations, say in Newcastle and in Sheffield, might be on a different standard altogether. He should very much like to see men study more than they did, but two or three speakers had already touched the secret of the whole matter in saying that nothing but compulsion would make this a success.

Mr. MARTINDALE said there was no royal road to pharmacy any more than anything else, and whatever the Council might offer in the way of prizes to encourage study would do little to get over the apathy of apprentices towards education. But it was not so much the apathy of the apprentices as of the masters towards the apprentices. They had undertaken to train them and supervise their studies, and they should see that a certain course of education was gone through in each year of the apprenticeship. If the masters could only be got to see that this was their duty it would be a great help, but the only way to do that was by means of the curriculum. It was quite right that the matter should be considered by the Committee, but the great difficulty would be that nothing could be done without compulsion. This system appeared to him rather too much like grandmotherly education, and he hardly liked the multiplication of these small prizes of books, which seemed somewhat paltry. If prizes were to be given they should be something worth working for, like the scholarships.

Mr. HILLS said he was in rather a difficult position, for he was very much in sympathy with Mr. Leigh, and admired the moderate way in which he had introduced the subject, and he was much in favour of anything that would encourage education; but on the other hand he failed to find that any one speaker who had spoken was in favour of the motion, and he thought it would be almost better to have an amendment, if necessary. But he should prefer asking Mr. Leigh if he would not be content to put off this matter for a short time until the Curriculum Bill had been got through. If the next motion on the paper were passed there would be a great deal of work to do, and it would require all the efforts of the Council to advance that as much as possible. Several speakers had intimated already that compulsion was the only motive power on which reliance could be placed to induce young men to continue their studies during apprenticeship; he hoped the Curriculum Bill would soon be passed, and then it would be possible to see what it would effect. He agreed with much of what Mr. Martindale had said as to the duty of masters, and also with Mr. Atkins and others, that local institutions should be encouraged as much as possible rather than individual study.

Mr. NEWSHOLME said when he received Mr. Leigh's circular he thought this was a splendid scheme, and he gathered that many thought so too, but he had gone through the matter very carefully, and agreed with many previous speakers that their only hope was in a compulsory curriculum. Under Mr. Leigh's suggested regulations he thought the same men who studied now would continue to study, and take all the prizes, and in the end they would be no better off. Until the new Bill became law nothing could be done, the matter must be left in the hands of provincial associations and the masters, and he would recommend the principals to take up this matter and put it in form.

Mr. RICHARDSON thought Mr. Hills had made a most practical suggestion. If it had not been for the calm and lucid manner in which Mr. Leigh had introduced the matter, there would probably have been many more attacks upon him, but not one speaker had positively blessed the scheme or given any hope that he would support it in Committee. As the second motion to be moved would, he hoped, be sent to the Committee, he hoped this one which Mr. Leigh had so ably proposed would be withdrawn. His view was that if this were passed it would considerably interfere with local associations, which might not be successful in some centres, but were very successful in others, and were doing a good work in a quiet, unostentatious way, and he should be sorry to see them starve for want of means. A good deal had been said about the apathy of students, but that would be found in every profession and walk of life. How many failed every year in the universities and in the medical and legal professions? What happened in the church he would not say, but it was rather hard on pharmaceutical students to suggest that they were more apathetic than other people. He hoped Mr. Leigh would see his way to withdraw this scheme for the present.

Mr. HARRISON was not sure that all the speakers had grasped the principle which underlay Mr. Leigh's motion, which seemed to him to be loyalty to the Pharmaceutical Society, whereas several of the latter speakers seemed rather to indicate that the loyalty should be to the local associations, which should conduct examinations and give prizes. If that were done there would be that irregular state of things which Mr. Martin had pointed out with reference to the prizes suggested by Mr. Atkins, that the questions set in one centre would differ from those set in another, and there would be prizes and certificates of the same value and supposed to indicate the same status based on different foundations, and therefore for purposes of comparison valueless. Others said that the Council should wait until the curriculum came into force; that would be waiting for an indefinite time, and he thought the Committee might take this scheme into consideration with the view of letting it take the place of the curriculum until it came into force. It was admitted there were only two methods, compulsion and attraction. He hoped the system of compulsion would soon be introduced, but Mr. Leigh presented a method of attraction in the most attractive form, and until the Society obtained larger powers, such as it was proposed to seek for according to the notice that was on the agenda paper for consideration that day, which he trusted it soon would, he thought it might be advisable for the Committee to consider this scheme with the view of putting it in force until those larger powers were obtained.

Mr. ABRAHAM thought Mr. Leigh's observations might be put into a nutshell; there was sufficient bait offered for the large fish, but not enough to catch the small ones. He greatly sympathized with this proposal, for he thought the system of offering a number of small prizes did more good than offering a number of large ones. The Council wanted to encourage the mass of pharmaceutical students, not to make half-a-dozen extremely proficient who would not do it for themselves. He did not think this system would at all hamper the local associations, but on the contrary would very much assist them.

The PRESIDENT said any details in the working out of a scheme of this sort, assuming the Committee saw its way to recommend it, would seriously affect local associations, but he thought it would be most satisfac-

tory to send this suggestion to a Committee. Possibly some points of the scheme might be useful, but he was bound to say the chief difficulty he had, assuming the scheme could be introduced immediately, was in respect to the effect on the mind of a student who having obtained a certificate for pharmacy, materia medica and botany in each year he competed, thus obtaining twelve certificates or prizes, then went before the Board of Examiners, failed to pass. It was rather difficult for their young friends to understand the distinction between that form of prize or certificate which was given by the Society as a voluntary body, and the certificate of having passed the Minor examination which the Board of Examiners had the power to refuse. He assumed the question would be referred to the Committee, and therefore did not propose to make any general observations upon it.

Mr. ATKINS said he was sorry not to have the consent of gentlemen like Mr. Martin and Mr. Harrison, but he failed to see the point of their objection to his suggestion. It was simply to give greater dignity and authority to the prizes given by local associations, and to endorse the work of those societies that commanded the confidence of the district in which they existed.

Mr. LEIGH said the President had assumed there would be twelve prizes, but that was not his intention; there would be only three, one for each year. The most successful youth would only get one prize or a certificate in each year.

The PRESIDENT said in that case the one prize would cover all four subjects, so that it would come to the same thing. The gentlemen would attend before the examiners having obtained a certificate for three succeeding years in the most important subjects, and it would be rather awkward for him if he failed.

Mr. LEIGH said with regard to Mr. Schacht's observation about the books, he thought they should be such as would be useful to the apprentice in preparing for the succeeding year's examination. The great opposition to the scheme was with reference to the Curriculum Bill, but it might as well be admitted that that was still in the dim future, and it might be in the far away future; it might never become an Act of Parliament. This scheme would do perhaps in an imperfect way what the Curriculum Bill would do, and until that became an Act of Parliament he thought the Council could not do better than accept the suggestion.

The motion was then put as amended, referring the subject generally to the Committee, and agreed to.

Mr. WATT said he hoped the Committee would give special attention to the financial aspect of the question.

A NEW PHARMACY BILL.

Mr. HAMPSON said all members were aware that in the year 1883 the Council made an attempt to pass a comprehensive measure which he regretted was not successful. Since then two or three attempts had been made at passing a Curriculum Bill, which again had not been successful. Although he did not say they had been frustrated by the opinion of others, but by the events which controlled and influenced the legislature, not only in this department of the law which they wished to alter, but in all others, he, however, entertained a strong conviction that it was the duty of the Council still to see what could be done, and as President Lincoln said on a memorable occasion, to "keep pegging away," and for that purpose he had prepared a resolution which he would read, as it had been slightly altered according to a suggestion from Mr. Harrison:—

> "That the Law and Parliamentary Committee be instructed to take into consideration the advisability of framing a Bill to be introduced into Parliament to amend the Pharmacy Acts, the scope of the Bill to include the scheme of a curriculum; provision for giving Associates in Business the privilege of membership; the adoption of one title for all registered persons practising pharmacy; and a method by which all persons who pass the qualifying examination shall be entitled to membership, and any other provisions for making the Pharmacy Act of 1868 a more complete enactment of the principle laid down in the preamble."

It was not necessary to read that preamble, because the terms were general and comprehensive. In this effort he did not suggest the Council should cover the same ground as in the Bill of 1883, for he did not think there was the slightest chance of passing a measure which would prevent co-operative societies trading. He did not say it was absolutely hopeless that the Society might at some future time become sufficiently strong, and that public opinion might not so ripen with regard to this question, as to enable them to make the alteration then attempted, but he desired in the first place to put in the front of this measure the scheme of a curriculum. It seemed to him that it was the keystone of any legislation. If pharmacists had any claim upon the attention of Parliament, it rested mainly on their educational aptitude, and it was essential that they should be so educated as to meet the public demand. The next point he wished to refer to was the inclusion or incorporation of all associates now in business, and who entered the business after the Bill passed, in the Society. At present there were a comparatively small number of life members, pharmaceutical chemist members and chemist and druggist members, and he regretted to say that these were gradually but steadily diminishing. What would be the result if the decrease went on as at present? The Society would become a decaying and an absolutely decayed and effete body. The work of the Society was to be carried on mainly by pharmaceutical chemists, but if they diminished in number by the deaths of members, and those deaths would occur with accelerated speed, and the increase of pharmaceutical chemist members did not take place in the anticipated proportion, the Society would be simply left high and dry. It was essential therefore with reference to the economic arrangements and carrying on of the Society that the number of members should be increased. He therefore proposed that all associates in business should be raised to the position of membership. They were partially members, and had certain functions already. By this step the strength of the Society would be increased, and a greater proportion of those carrying on business brought in, and by so doing the Society would be made sufficiently strong to undertake any fresh legislative efforts which might be thought desirable when the time came. With regard to the next idea, that all registered persons practising pharmacy should hold one title, he confessed it was one of very considerable difficulty, but it had to be considered. There were at present chemists, chemists and druggists, pharmaceutical chemists, members of the Pharmaceutical Society, associates in business, associates by examination, pharmacists, pharmaceutists, dispensing chemists, family chemists, and sundry other titles. He did not say that the Committee would recommend this alteration, but at any rate it was worthy of consideration whether some simplification of title could not be effected. There were other matters of great importance which might be added to this Bill, and one he specially wished to lay stress upon. He found that in Ireland at the present moment the dispensing by chemists or pharmaceutical chemists was protected; it occupied something like the position that the sale of poisons did in England, and in every Bill, without exception, introduced in the colonies this matter of dispensing was protected or legislated for. In England, however, where legislation took

place first, where much money had been spent and great exertions made for many years, not only without any recompense, but freely and voluntarily, chemists and druggists were absolutely without any legislative protection. He hated the word "protection," and wished he could find some other, but his meaning was they were not entitled specifically to exercise the calling of dispenser of medicine, and in this Bill he should like to include the clause which was included in the Bill of 1883. He did not wish to interfere with the dispensing by general practitioners; that was hopeless, but there ought to be some legal recognition of the chemist. There were many other points he might mention, but he earnestly desired that the Committee would take the matter thoroughly in hand. If not, the Curriculum Bill would not be passed, or anything else. Two or three years before 1883 Mr. Elias Bremridge framed certain suggestions with regard to the future of the Society in any legislative attempts which might be made, which, he thought, were well worthy of consideration, and he hoped a copy of those suggestions would be brought before the Committee.

Mr. HARRISON seconded the motion, and desired to support it very strongly. It had been perfectly clear for several years that the Act of 1868 had not proved all that was expected of it. After twenty years' working, great anomalies had been discovered in it, such as would be naturally expected in an Act which was a compromise between a number of conflicting interests. Those conflicting interests had now come to a head, and the time had come when some definite step should be taken to remove them. He agreed with Mr. Hampson, that it was not desirable to attempt to stop the practice of pharmacy by co-operative societies, but it was quite possible for the Committee to frame a clause in such a way that all persons who practised pharmacy should do so under the same conditions. They should frame the principle laid down under a preamble that they proved themselves competent to carry out the work entrusted to them. He went for this enlarged scheme the more readily because he did not think it was possible—and the last two or three years must have proved that it was impossible—to pass a small scheme, even for a curriculum, unless some such scheme as this was embodied in it. If the Council went for a curriculum scheme which would provide for greater educational advantages, and at the same time give greater commercial advantages, the enthusiasm of both classes of members would be aroused. Those who placed greater reliance on the educational status of members would combine with those who looked for greater advantages from legislative provisions, and in that way, and in no other way that he could see, an amount of enthusiasm might be aroused which would enable them to pass a formal enactment, but without that he failed to see the slightest chance of obtaining any legislation at all. A Curriculum Bill, pure and simple, the great mass of members were almost entirely uninterested in, and would not support, but if the two were combined the whole body of members would rise together and support it. It was perfectly clear that if chemists and druggists laid before Parliament, as a combined body, the claim that men who exercised the same calling should be accorded the same amount of consideration in the exercise of that calling, Parliament sooner or later would grant what was asked, and he could not think that there was any moment more propitious than the present for obtaining such a measure. There was no great measure pressing on the immediate attention of Parliament, and if such a Bill was pressed during the next session, there would be a better chance of obtaining a careful hearing than if it was postponed for two or three years, when in all probability one or more questions of burning importance would be before the country in a very tangible form. He hoped, therefore, this resolution would be sent to the Parliamentary Committee in order that a Bill embodying all that was required and believed to be necessary for the protection of the public—not the protection of themselves, and nobody was more competent than they were to judge what was necessary for the safety of the public—might be presented to Parliament. If that were done he believed it would receive at all events careful consideration, if not absolute acquiescence.

Mr. RICHARDSON had great pleasure in supporting the motion, and agreed with every word enunciated by both the proposer and seconder. He was particularly glad to hear the remarks of Mr. Harrison, representing as he did so very large a constituency of those who had not thought fit to join the Society, and who had hitherto been termed, perhaps somewhat improperly, "outsiders," and whom they all wished to get into the Society in some way or other. It had been frequently said that they had the opportunity of becoming members if they liked, but he knew a great deal about members in the provinces, and there was that guinea which always stood in the way. He would go a step further, and endeavour to get every member of the trade connected with the Society, in order that they might assist in returning members who should govern them in the conduct of their business. He hoped sincerely that some method might be arrived at by the Committee which would include the whole body of chemists and druggists all over the kingdom, that they might not only be a body in name, but a strong body, in fact able to carry future legislation. He was convinced it was not the slightest use attempting to pass a Curriculum Bill unless there was something behind it which would please the trade at large. He believed every man in Scotland would vote against the Curriculum Bill.

Mr. WATT said that was not so.

Mr. SCHACHT said he should very much like this motion to be carried, but he was afraid he could not quite follow those who had spoken in the opinion that the more that was added to the clauses of a Bill proposed to be introduced the more likely the Bill was to be carried. He had argued several times on the opposite side, and he would remind those who had used that argument that in the first year of its introduction into Parliament it was within an ace of being carried, having gone through everything but the very last stage, and having only been crowded out by the pressure of business during the last few weeks of the session. He doubted whether it would have stood such a chance had there been half a dozen other considerations included in the Bill. Still he did not think that was sufficient ground to exclude the consideration of this proposal from the Committee. The alteration proposed was very important, and he was not quite reconciled to the introduction of any matter other than what was included in the curriculum. The effort to make all the Bill a little more exactly in accord with the preamble would, in his opinion, be very useful indeed, and he should recommend that preamble to the careful study of every member. It said:—"Whereas it is expedient for the safety of the public that persons keeping open shop for the retailing and compounding of poisons, and persons known as chemists and druggists, should possess a competent practical knowledge of their business . . . be it enacted." That was extremely important, and anything which would serve to bring the Act in absolute accordance with those words would have his entire support.

Mr. ATKINS said he should certainly vote for this motion going to Committee, but he did not agree with the mover and seconder in the opinion they held very strongly that they would succeed in carrying what they both admitted to be of primary importance, the educa-

tional portion of the measure, by weighting it with other matter. Members of Parliament to a large extent had been educated up to a certain comprehension and understanding of that subject, and it would be necessary to go through the same process of education right away from the beginning, if a large amount of matter which would necessarily be controversial were put on board the ship. Mr. Hampson admitted that on one point he saw great difficulty, a difficulty which he hoped would be solved, and he was quite prepared to let that question go to Committee, but he felt strongly that the keystone of the argument was the question of compulsory education. By slow processes he had arrived at that conclusion himself, and was very strong in the conviction that that must come first before other matters could be solved. It showed the enormous advance made since ten years ago, when many were determined to put down co-operative stores and other evils, but they found that events had been too strong for them, and they were not now going to enter on a crusade against those great bodies. The great question with him was this, that the Council was agreed on the curriculum, and he feared it would imperil the principle of compulsory education by loading the Bill with a large amount of extraneous matter, however important that might be.

Mr. HILLS said he should like to support the motion, but he felt very much sympathy with the last two speakers, as to the advisability of adding other matter to the Curriculum Bill. Others, however, wiser than himself thought otherwise. It seemed to him the idea was to get the support of chemists generally by giving them all they wanted, for instance, giving associates in business the privilege of membership, but whatever might be thought at that meeting there would be a number who took a different view, and controversial matters would be immediately raised. The great point in presenting any Bill to Parliament was to present it with as little matter likely to be opposed by their own members as possible, and it seemed to him that the Council would be more likely to get a Curriculum Bill by going simply for that than by introducing extraneous matter. At the same time he was quite willing that this should be considered, and if, as Mr. Harrison said, and he could speak with great authority on these matters, by introducing these other points they could go as a combined body, if the 14,000 registered chemists and druggists would go in a combined body, there was scarcely anything but what might be got.

Mr. ALLEN desired to accentuate what had been said by Mr. Hills. He was perfectly in accord with the proposer of the motion in desiring that a matter of this kind should be submitted to a Committee, but he could not follow out the argument of Mr. Harrison that because the Bill had other things in it, it was more likely to be passed. Those present were nearly all committed to the theory that a Curriculum Bill was better unweighted by any controversial matter, and it always seemed to him unfortunate that in any desire they had for legislation for the good of the public at large they must always tread so hardly on the toes of some of their own friends, and he feared a Bill of the kind now advocated by Mr. Hampson would put an enormous strain on the loyalty of members of the Society and pharmaceutical chemists. In years past several attempts had been made to procure that united loyalty on the part of members and pharmaceutical chemists, and amid all the outcry this desire for the general good of the trade had to some extent prevailed. He could only hope now that if the Council went to Parliament with a Bill which must to some extent take away the particular rights which members of the Society and pharmaceutical chemists now enjoyed they would still have the loyalty of the whole body of the trade, and more particularly of their own members. If unity in that direction could be secured he was sure the Bill would get that attention in Parliament which it desired.

The VICE-PRESIDENT said he should be very sorry to offer any opposition to this question being considered in Committee, but it would be very undesirable that it should be relegated to the Committee with a foregone conclusion, and therefore he hoped the wording might be modified, and that in the third line, instead of the scope of the Bill including the scheme of a curriculum, it should state the subjects for the consideration of the Committee should be so and so. The motion involved the necessity of a Bill containing the whole of this matter or nothing. He was quite prepared to accept the curriculum, but not to adopt one title for all members practising pharmacy.

Mr. HAMPSON said he did not wish to bind the Committee in any one particular. He rather wanted on that occasion to gather an expression of opinion, but certainly not to tie the hands of the Committee.

Mr. MARTINDALE said he had great sympathy with Mr. Hampson in his motion. The wish to consolidate the Society was certainly very laudable, but in doing so the position of those who had been examined must be considered. When the Pharmacy Act, 1868, was passed he was one of those who, having just passed the Major himself, felt that the desire of Mr. Hampson to get all who had passed the examination affiliated with the Society as members was hardly fair. The membership seemed to the outside public to give such a strong title, higher even than pharmaceutical chemist, chemist and druggist, or associate, that to confer that on the whole would be making the title of little service. Although membership might be granted to some extent, it would still be a system of confiscation to abolish the two grades which existed in the Society conferred by the Major and Minor examinations, unless the lower examination was brought up to the standard of the present Major. It would be even unjust if a title were conferred on those who had merely passed the Minor. The question was, did the public require a higher standard of examination? and he was somewhat inclined to doubt it. Chemists were required to carry on business in small country towns and villages, and it was also desirable to encourage a higher class of chemists who were engaged in large centres and big towns, so that they might be more on a par with their medical brethren. The object was not merely to grant a pass examination to retailers of poisons in small places, but to have a higher standard for those who would aspire to something higher. The examinations which had been conducted during the last twenty years had produced a great effect, and had raised the position of pharmacy very much, but they rather tended to produce a dead level. The mass had been elevated very considerably, but they had not the great lights they had in former times, and it appeared to him that the adoption of Mr. Hampson's view was going a considerable way on the lines of trade unionism. It was a good principle, as far as it went, to define their rights as much as possible, but there were still those who would aspire higher, and it was the duty of the Society as an educational body especially to encourage those who wished to attain a higher grade. If there was one title only those energetic spirits would be checked, or they would be driven outside the trade to obtain titles from other societies or corporations in such a way as to be detrimental to the interests of the Society. He could hardly agree therefore with the idea of one title for all persons practising pharmacy, but for the sake of consolidation should be willing to grant all associates in business the privilege of membership.

Mr. RICHARDSON asked if Mr. Hampson objected to a higher title being given to a higher qualified man.

Mr. HAMPSON said he had no particular objection.

Mr. MARTINDALE said the adoption of one title was part of the motion, and that he objected to. The only point he would be willing to concede would be the consolidation of the Society, so as to get as many as possible who were at present outside it to join by offering them membership if they chose, instead of the title "associates in business." Doing this would strengthen the position of the Society in going to Parliament, and for that purpose it would be worth doing. He should still, however, confine the title of pharmaceutical chemist to those who had passed the Major examination. He had thought over this matter very carefully, and he could not see his way to going further than he had indicated, which was, to a certain extent, a sacrifice of the interests of the Major men, but it was a sacrifice which it might be worth while to make in the interests of the whole body.

Mr. CROSS said he should vote for the motion, and as in former years he had supported the idea of a Bill simply for a curriculum, he was very glad to see that that claim was the first mentioned by Mr. Hampson. At the same time he should attend the Committee with an open mind and see if other provisions could be embodied in the Bill which would be useful to the trade at large. The curriculum was better understood throughout the country now than it ever was before, and there was greater unanimity amongst all sections of the trade as to the desirability of its becoming law. Compulsory education, as well as compulsory examination, was now universally looked upon as the great want in pharmacy, and if any other provision was attempted to be added to the Bill which would jeopardize it he should vote against it, because the great difficulty in approaching Parliament was confessedly the want of unanimity amongst themselves. Mr. Martindale had illustrated one important point, namely, the appropriation of a title, and many people still held the view that having once obtained the title of pharmaceutical chemist it was unfair to confer that title on men who had not striven to gain it in the same manner. But there was another question which ought to be embodied in future legislation, and that was the qualification of the individual. With regard to fighting the stores *qua* stores he had no sympathy, but he did think it was unfair that men who were compelled to be examined should not have that protection which was alike good for the public and themselves in the pursuit of their calling. So long, then, as corporations employed qualified men he did not think they should find fault with them, and if they could embody that in an Act of Parliament it would be satisfactory to those who were seeking to enter the calling. All matters of detail he would leave for the present, but he hoped the Council would continue to knock at the door of Parliament until it obtained what was absolutely necessary to the trade—a Curriculum Bill.

Mr. ROBBINS thought it was most desirable to unite the whole trade into one body, but could hardly see that this motion was likely to accomplish that purpose. It appeared to him rather otherwise. It was always said that it was necessary to go to Parliament as a united body if there was to be any chance of passing a Bill; but it was now proposed to disfranchise 1700 pharmaceutical chemists, or to take away their privilege, and he did not think that was the way to get a united body. Again, if there were to be one title only there would be only one examination, for no one would go in for a second if he could get nothing by it. Mr. Hampson thought if this Bill were passed the whole trade would join the Society, but he could hardly see that. The Society could not be carried on without money, and so long as the guinea subscription was charged he feared it would always be a difficulty. If Mr. Harrison could get the whole trade to come and bring their guineas when the Bill was passed it would be a great motive for passing it, but he feared there would not be a very large accession.

Mr. HARRISON said he did not intend to convey the impression that all would become members of the Society, but that all would join in obtaining a Bill.

Mr. WATT was extremely gratified with the reception this motion had met with. The process of education of the Council had been very rapid, and he was very much pleased to see it. It was very different from the reception accorded to a motion brought forward in committee some time ago, and he cordially indorsed what Mr. Hampson and Mr. Harrison had said. He slightly differed from them as to putting the educational part first, and was rather disposed to put them together and to state that legislation appeared to him to be the most important. He hoped the fullest consideration would be given to the measure, and that no attempt would be made to strangle the motion. The expression of opinion in favour of going in for a large measure had been very strong, and he thought if a Curriculum Bill were to be passed, the only hope of doing so was in combination with a measure which would benefit the trade generally. He did not say such a Bill would unite all the trade, but the great body of chemists would join. With reference to the addition of members, the anomaly of that Society representing 14,000 chemists with only 3000 members was one which could not be remedied a day too soon. The title was a matter which might be easily solved. All it was necessary to do was to see that persons were qualified to discharge the duties incumbent on them. That was the first and should be the only consideration. If any persons chose to take a higher title, there was no objection, so far as the Society was concerned, but he did not think it was a matter for serious consideration, but rather one of sentiment. It should be encouraged, but it was not essential to the discharge of the duties of a chemist and druggist that he should be a pharmaceutical chemist. He could sympathize with the wish of those who had passed the measure that they should be recognized as such, and had no objection to give a higher title to those who went in for it. Like a previous speaker he did not like the word "protection," and he considered it was only fair play. That a man who was educated to a trade or profession should be put upon an equality with one who was not educated was not fair play. It was not protection any more than in the case of a medical man who could not practise without being qualified. He could not see how Parliament could refuse the reasonable request when the qualification of the individual was put as the ground on which pharmacists claimed the right to discharge the duties of their profession. He was decidedly of opinion that if 1800 or 1400, or even 1200 men went for a measure they would undoubtedly carry it, whatever government was in power, and he hoped nothing would stand in the way of their going in a united body to put the trade in a proper position before the country.

Mr. HILLS said he should be very glad to hear definitely from Mr. Watt whether he was in favour of a curriculum or not.

Mr. WATT said he hoped the curriculum would be passed.

Mr. CROSS also said he perfectly agreed that the only proper protection was the personal qualification.

Mr. NEWSHOLME said now the motion was modified so as not to bind the Committee to the particular form of procedure, he could heartily support it. On previous occasions he had often referred to the question of associates having a standing on the Council, though he failed now to go quite so far as Mr. Hampson. But he did hope the curriculum would be put in the forefront of the Bill. He should not be prepared to go further with the next clause than giving associates in business the

privilege of membership. If the Bill were confined to that he thought it would have the support of associates in business throughout the country who during the last session had done a considerable amount of damage to the Curriculum Bill. He believed their great ground of opposition was that they ought to have some better representation, and though it might be argued they could easily get that by passing the Major, as they were allowed to carry on business, he thought it was only right they should have, as they said, personal representation on the Council.

Mr. WATT said what he objected to was going for the curriculum alone. He did not object to it in combination with other matters.

Mr. GOSTLING was in favour of the motion being submitted to the Committee, but felt strongly with Mr. Martindale that the pharmaceutical chemist should retain his distinctive title.

Mr. ABRAHAM said if there were one qualification the examination would have to be levelled up or levelled down. If it were to be levelled up all chemists would be made pharmaceutical chemists, and if it were levelled down it would simply remove from the pharmaceutical chemists their present exemption from jury service, which was a very valuable privilege. One gentleman said that so long as the assistant was qualified it appeared to be quite immaterial whether the principal was qualified or not, but he should be very sorry if it were to go forth that that was the opinion of the Council. He maintained that it was of the utmost consequence that the principal should be qualified. The assistant merely sold or dispensed drugs which were given to him by the principal, and if bad laudanum or opium were supplied him, the assistant had no means of finding out the inferiority of the articles. He strongly maintained, as he believed in accordance with the principles of the Pharmacy Act, that the qualification of the principal was essential to the proper conduct of the business.

Mr. MARTIN said it was with considerable pleasure that he saw this notice of motion on the agenda, because other members of the Law and Parliamentary Committee would remember that last year he emphasized very strongly the view that it was not desirable to go to Parliament for a Curriculum Bill alone. It was not necessary to-day to discuss in detail what the new Bill should contain. The motion simply implied that the Committee should entertain the idea of adding something to the Curriculum Bill, and with that explanation he most cordially supported the motion. Mr. Hampson said, with regard to the Curriculum Bill, it was not quite clear, even on that Council, that they were all united in desiring to keep it free from other matters, and he thought that was a fair reflection of opinion outside. It was clear that the trade were not with them with regard to the curriculum solely. He admitted it had the support of the *élite* of the trade, though there were exceptions even to that, and, on the other hand, there was a strong opposition to it. With regard to opening the doors of the Society to membership he could not conceive for a moment there could be two opinions as to the absolute necessity of taking that step. It was not only a question of arithmetic that the chemist and druggist members would soon be *non est*, but they knew also at the same time that in the course of perhaps twenty years, with an addition of perhaps about fifty qualified as pharmaceutical chemists, the management of the Society would be left in the hands of a mere handful, and that was not desirable. To remedy that, and if possible to make a great effort to get into the Society as members the large number of those practising pharmacy under the name of chemists and druggists, he wanted the doors open to admit them. He did not say with the guinea, or without the guinea. That was a matter for the Committee to decide, and it would require considerable thought. He hoped the Committee would meet shortly to consider this matter, and that a Bill might be framed which would meet with the support of something like the entire trade. It was a mere guess whether the curriculum would float with or without other matter. He was strongly in favour of a Curriculum Bill, and also strongly in favour of some additions being ma le to it, which he did not think would embarrass its progress.

The motion was then put and carried.

It was also resolved that the Committee should meet in the following week.

THE MEDICINE STAMP ACTS.

The PRESIDENT read a communication from Mr. Barnard S. Proctor, of Newcastle-on-Tyne, enclosing a memorial on the subject of the Patent Medicines Act, and suggested that it be referred to the Law and Parliamentary Committee.

Mr. HARRISON said he was going to move that the memorial, which he believed had been sent to every member of the Council, accompanied with a circular on the same subject, be referred to the Parliamentary Committee.

Mr. MARTINDALE seconded the proposal. He thought it was well worth consideration, for chemists wanted to know where they stood, and had been very much harassed by the Inland Revenue authorities, much more than they were in former years. He had been required to stamp certain articles which were held to be liable, though he held they were not, and in former years similar labels were exempt. It was never intended that such things should be included, and he did not like having to put a quack medicine stamp on these preparations. Of course, if it were held they were liable to duty he must submit to it, but he wished if possible to prevent all medicines from being included under the Patent Medicine Act. It had been explained by the President on a former occasion that this duty was not paid by them but by the public, but they certainly had to buy the stamps in the first place, and in addition to that many persons objected to buying articles bearing this stamp which had the appearance of being quack medicines.

The memorial was referred to the Law and Parliamentary Committee.

MEDICATED WINES.

The PRESIDENT said a communication had been received from the Executive of the North British Branch, enclosing a resolution asking the Council to approach the Board of Inland Revenue as to the conditions on which chemists might sell medicated wine, such as pepsine and coca, without infringing the law. He thought that might be sent to the same Committee. The answer given to the application was that any chemist and druggist might sell medicated wine, such as pepsine or coca, if a sufficient amount of pepsine or coca was put into it as to leave the wine a medicine and not a beverage; and he did not think there was much more to be done. The subject was not free from difficulty. It was not desirable to encourage pharmacists taking out licenses or to deal in all sorts of liquors of that sort. He believed the authorities were disposed to do anything which could be shown to them to be proper in the matter, but their attention had been called to the fact that large quantities of so-called medicinal wines were being sold. Their attention was called to that not only for the purposes of the revenue but by those who thought that the taking of wines and spirits was undesirable. It sometimes happened that just in proportion as people became publicly teetotal so they went to the pharmacist for more medicine than before, such medicines very often partaking of the form of alcohol or medicinal wines.

Mr. HARRISON said he quite agreed it was very de-

sirable that this matter should be considered, as it was also very desirable that pharmacists should not sell potable wines as medicines. It sometimes worked great moral evil, for many persons were induced to take wine who otherwise would not be led into it. Perhaps all that could be done was to ascertain what degree of medication would suffice to relieve wine of the excise duty.

Mr. GOSTLING said he knew one particular patent medicine, the name of which he mentioned, which was much used by teetotalers.

The PRESIDENT said that contained a fair amount of spirit.

Mr. GOSTLING said so he was told.

Mr. WATT desired to endorse what had been said about the undesirability of chemists having anything to do with a license.

The communication was referred to the Law and Parliamentary Committee.

APPLICATION FROM THE MIDLAND COUNTIES CHEMISTS' ASSOCIATION.

An application from the Midland Counties Chemists' Association for a grant of £25 for the purchase of books was referred to the Library Committee.

ADDENDUM TO THE PHARMACOPŒIA.

The following letter from Dr. Quain on the subject of the Pharmacopœia was read:—

"General Council of Medical Education and Registration of the United Kingdom,

"299, Oxford Street, London, W.

"December 3rd, 1889.

"To the President of the Pharmaceutical Society of Great Britain.

"Dear Sir,—The General Medical Council having decided to publish in the course of the ensuing year an addendum to the British Pharmacopœia, 1885, with the view of introducing new substances which may have received the general approval of the medical profession, have given authority to the Pharmacopœia Committee of the Council to make the necessary arrangements for carrying this object into effect under the direction of the Council.

"I need scarcely say that it is of the utmost importance to obtain accurate information as to which of the comparatively new medicines and compounds possess well-recognized medicinal value, and the Committee are seeking the co-operation and assistance of the various medical authorities with the hope of obtaining this information.

"And as to the manner of preparing or defining the medicines and compounds, the Committee are instructed to invite opinions from the members of the Pharmaceutical Societies of Great Britain and Ireland, and of pharmacists generally, through the councils of those societies or otherwise.

"But as regards these matters of practical pharmacy in connection with the Addendum, the Committee would gladly avail themselves of the special resources of the Pharmaceutical Society of Great Britain, in their Library, Museum, and Laboratories, and have desired me to request the assistance of the Council of that Society in this pharmaceutical direction.

"I have, therefore, on behalf of the Committee, to ask you to submit this communication to your Council and to express the hope that the Council will comply with our request for opinions and assistance in the directions indicated. In that case the list of suggested articles when in form would be forwarded to you. I may add that the reporter on the British Pharmacopœia to the Medical Council, who is charged with the general editorial arrrangements, would be authorized to co-operate in any way that may be desired by the Pharmaceutical Society.

"I am, yours faithfully,

(*Signed*) "RICHARD QUAIN, M.D.

"*Chairman of the Pharmacopœia Committee.*"

The PRESIDENT suggested that he should be authorized to send a reply saying that the Council would be willing to render the assistance required and would be prepared to appoint a Committee in due course.

A resolution to this effect was passed unanimously.

CORRESPONDENCE.

The PRESIDENT read a letter which had been received from the Liverpool Chemists' Association enclosing a resolution passed at a special meeting with regard to the recent prosecution of an assistant for selling poison.

Another communication on the same subject had been received from one of the divisional secretaries—Mr. Nind. He thought he might convey to him in reply that his suggestion would receive in due course the consideration of the Parliamentary Committee.

GENERAL PURPOSES COMMITTEE.

The report of this Committee, which was taken in Committee, included the usual report from the Solicitor, stating the progress made with cases which had been placed in his hands. In one case judgment had been given against a defendant who had since filed a bankruptcy petition. As already reported in the Journal judgment had been given against the defendant in the Battersea sale of poison case, but notice of appeal had been received, and copies of correspondence which had passed between the solicitor of the Society and defendant's solicitor were enclosed. A letter had been received also from the defendant's employer asking whether the Council would accede to an arrangement for each side to pay its own costs in an appeal. It was recommended that the Secretary be instructed to reply to the effect that the Council is acting ministerially, and that it does not appear fit and proper that the usual course of procedure in the Courts should be departed from.

Several other cases of alleged infringement of the Pharmacy Act had been considered by the Committee, and it was recommended that proceedings be taken.

On resuming the report and recommendations of the Committee were received and adopted.

BENEVOLENT FUND GENERAL MEETING.

ELECTION OF ANNUITANTS.

A General Meeting of the Members and Associates of the Pharmaceutical Society and of the Subscribers and Donors to the Benevolent Fund, was held at the house of the Society, 17, Bloomsbury Square, on Thursday, December 5, at 12 o'clock, for the election of FOUR ANNUITANTS.

Mr. ALEXANDER BOTTLE, Vice-President, in the chair.

The notice convening the meeting was read.

Scrutineers were appointed, who examined the voting papers and brought up the following report:—

Scrutineers' Report.

We, the undersigned Scrutineers, appointed at the twenty-fifth election of Annuitants on the Benevolent Fund of the Pharmaceutical Society of Great Britain, do hereby certify that we have examined the voting papers committed to us, and report the following result:—

Mumbray, Henry G.	5482
Edwards, Hannah C.	5200
Pitman, Emma	4392
Copney, William	4182
Spendelow, Mary E.	4144
Brown, Eliza	2717
Davis, Samuel Forbes	2402
Suggate, Henry E.	494

*3660 voting papers were received, of which number 96 were informal (59 unsigned and 37 incorrectly filled up, representing a total of 272 invalid votes) and were disallowed.

W. K. Hopkin, *Chairman.*

R. O. Fitch. Henry Long.
John Butterworth. T. Howard Hall.
J. T. Tupholme. John Morris Broad.
H. Bate. Geo. B. Hatfield.
Snowden Kirk. Wm. Gulliver.
Richard Thomas. J. C. Hyslop.
W. Prior Robinson. F. T. Silvers.
Edward B. Stamp. John Goodwin.
Ralph Hall. H. F. Austin.
H. Bowman Spink. J. Carter.
T. O. Sandell. Edwd. Cullinan.
E. L. Hickey.

December 5, 1889.

The Vice-President then declared the following four duly elected Annuitants:—

Mumbray, Henry G.
Edwards, Hannah C.
Pitman, Emma.
Copney, William.

* 5679 voting papers issued.

Provincial Transactions.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The third meeting of the twelfth session was held in the Pharmaceutical Society's House, 36, York Place, Edinburgh, on Wednesday, November 27, at 9.15 p.m., Mr. A. Russell Bennet, President, in the chair.

The minutes of last meeting having been read and approved, the Chairman called upon Mr. Hill, in the absence of the author, to read the following communication on—

Our Vegetable Extracts.

BY PETER MACEWAN.

After a few introductory remarks, in the course of which the writer referred to decoctions and infusions and their probable future, he proceeded to say that the aim of extraction is to obtain the active principle of a drug, in its natural state, if possible, in a solution which will retain its activity and not deposit any of its valuable constituents on keeping. It is not possible, without introducing strictly chemical processes, to obtain the active principle alone; it is necessary to take along with it the "extractive," that being the name for all sorts of substances of which we know little, and of many of which we know nothing. Even our knowledge of active principles is limited to a small number of drugs; consequently we are compelled to take out of most drugs all that will dissolve in the menstruum employed. Obviously the best time to achieve this object would be when the drugs are in a fresh condition, for the active principles are in most instances dissolved in the plant juice, or the juice may be saturated with the principle, while some of the latter is also deposited in the tissues. In both cases the substances are, while in the moist state, better fitted for extraction than when dried. The process of drying cannot be without effect on vegetable principles—the most delicate compounds with which we have to deal.

We take too little advantage of fresh drugs in our pharmaceutical practice. Why, for instance, should we not make the tinctures of belladonna and henbane from these drugs before they are subjected to a process of exsiccation, which is certain to injure the extremely delicate principles to which they owe their activity? The instances in which we do use fresh drugs are not assuring of our regard for the superior virtues of such drugs; as it happens that in most cases the preparations are but little used, or are employed as pill excipients and placeboes. The writer proceeded to advocate a closer study of fresh drugs, and then commented on the treatment of dried drugs before they are brought in contact with menstrua. As a rule, we are apt to powder drugs somewhat too finely. This is not a disadvantage for simple maceration, but for percolation fine powders are more of a loss than a profit. Insufficient swelling, bad packing, and other causes tend to impair the process of percolation, and too fine a condition of the drug is an aggravation. We may employ fairly coarse powders, and given a period for thorough maceration, there is little reason why we should use in any case powders of greater fineness than No. 20.

The methods of extraction were next referred to. Maceration he said is a process which is not suitable for the preparation of solid or liquid extracts, because it requires an amount of menstruum relatively large to that of the drug. That is a circumstance which is distinctly unfavourable for extracts, because it means evaporation more prolonged than it need be. It is the process, nevertheless, which the Pharmacopœia employs in most cases. On the other hand, it is very little used—exclusively used—in the preparation of tinctures. There are only eight instances, apart from cases of simple solution, in which maceration is exclusively used for the preparation of tinctures.

In the case of the thirty-two 1-in-8 Pharmacopœial tinctures made by percolation—not to mention the 1-in-10, and even 1-in-27 ones—percolation is unnecessary—indeed it has by experiment been proved to be so, and that a week's maceration is more effective than percolation, so far as tinctures are concerned. The objectionable feature of the Pharmacopœia process is that it is neither one thing nor the other; the maceration is not continued sufficiently long, and the conditions of percolation are not on the correct lines, and rather favour loss of spirit. The whole process might be improved on modern lines; but the necessities of the case only require all the tinctures weaker than 1-in-5 to be made by simple maceration for eight days, the drug being kept suspended in the spirit. The weakness of our official percolation process as applied to tinctures is the use of so much menstruum for preliminary maceration. The proper plan to pursue would be to moisten the drug with half its weight of menstruum, allow to swell, then pack in the percolator, and continue to percolate with the remainder of the menstruum. The drug is exhausted long before the half of the menstruum is used.

Speaking of standardization, the writer advocated that something in the nature of characters and tests should first be introduced into the Pharmacopœia. We should have notes on colour and odour, and factors about specific gravity and percentage of extractive matter. In the absence, and even in the presence of

well-characterized principles, such factors as these are a good indication of the quality of the preparation.

In regard to fluid extracts, the writer said that they are, in a sense, concentrated tinctures. There is not a single Pharmacopœia preparation of this class, except liquorice, which has not a faulty formula. In the case of cimicifuga and coca the faults of the tincture-percolation process are present in an exaggerated degree. We take 20 of drug, macerate in 40 of spirit, then transfer to a percolator, and collect the first 15 of the filtrate—we do not get a percolate when we work in this way. What we ought to do is to moisten 20 of the drug with 10 of spirit, allow to stand for some time, then pack and percolate. In this way there is some hope that the first 15 ounces will really be so much stronger than what follows it that there is some reason for reserving it. Cascara sagrada and black alder extracts have very poor formulæ. Sarsaparilla and fluid taraxacum would be much better if there was not such a prodigal waste of spirit. Why not treat 40 parts of each with 20 of spirituous menstruum; then pack in a percolator, displace 20 ounces with water, and use the subsequent aqueous percolate for evaporation? Ergot is a notorious example of blundering. This extract will never be right until we stop heating it.

In the remaining portion of the paper the writer dealt with solid extracts, confining his remarks to concentration by the different methods of evaporation now in use, viz.:—(1) Evaporation in open steam-pans; (2) evaporation *in vacuo* at a temperature varying from 30° to 40° C.; (3) concentration by freezing and subsequent evaporation of the concentrated liquid at a low temperature. The apparatus employed in each section was described, a few historical comments being given to show the advances which have been made during the past sixty years.

The Chairman, in moving a vote of thanks to the author, which was awarded with acclamation, said he was sure they all agreed with him in feeling that they were much indebted to Mr. MacEwan for the continued interest he showed in their work and for this interesting and suggestive communication. The subject was one of much practical interest, and they would have observed that it had made its appearance in one form or another at almost every Conference meeting in recent years. He agreed with the opinion that it would be an advantage to have in the Pharmacopœia some characters and tests for galenical preparations. There was also no doubt that by improved formula for official preparations much might be done in the way of preventing waste of spirit.

Mr. Lunan, in seconding the vote of thanks, said the scope of the paper was more extensive than the title indicated, and included the whole question of the exhaustion of drugs. He thought it was a good thing to have galenical preparations as near a uniform standard as possible, but he did not see how this agreed with the author's proposal to use fresh drugs. These varied very much in the percentage of water they contained, and there would be a corresponding variation in the products. He was much interested in the elegant and scientific method of preparing extracts by freezing. He thought they must admit that in many respects the French pharmacists were in advance of their British *confrères*.

Mr. Duncan said it might be quite true that it would be best to make galenical preparations from the fresh drugs, but he thought one great difficulty in the way would be the fact that they could not be obtained in a fresh state, except at one season of the year.

Mr. Drummond said there was undoubtedly great room for improvement in the direction of adjusting the menstruum to the drug, and this subject offered a wide field for experiment. There was one point suggested by the paper, and that was that the constitution of the Pharmacopœia Committee was much too narrow. It consisted of only three persons. He thought it should be much larger, and ought to include several practical pharmacists as well as medical men.

Mr. Dougall said he thought the author was correct in saying that there was a tendency to carry the powdering of drugs much further than was at all necessary. He could also confirm his adverse criticism on the official process for percolation. If the drug were simply moistened with sufficient menstruum to cover it, then packed in a percolator and more menstruum poured on, it would often be found that the percolate would come through almost as thick as syrup, and the drug would be completely exhausted long before the whole of the menstruum had been used.

Mr. D. McEwan said he thought the suggestion that official tinctures, etc., should have characters and tests given was a valuable one.

Mr. Hill said Mr. Lunan's objection that fresh drugs varied in percentage of water could be met by following the method adopted in the Homœopathic Pharmacopœia, namely, drying a portion of the drug so as to determine the percentage of water, and then taking a weight of fresh drug equal to a constant weight of dry drug, counting the water in the drug as part of the water required to make up the proof spirit menstruum. He could not say he entirely agreed with the author as to allowing the manufacture of galenical preparations to pass into the hands of large manufacturers. If that was to be the case how were apprentices to be trained in practical pharmacy. He had recently met with a case which seemed to support the view that fluid extract of cascara became inert when long kept and exposed to the air.

The Chairman reminded members of the Annual Conversazione on December 13, and intimated that an excellent concert programme had been arranged. He also intimated that next meeting would take place on December 11, when papers on "Ext. Cascaræ Sagradæ Liquid," by John Findlay, and "Seidlitz Powders," by J. H. Hoseanson, will be read.

The meeting then closed.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The fourth meeting of the session was held on Thursday, November 28, in the Society's Rooms, Colquitt Chambers, 6, Colquitt Street, the Vice-President, Mr. J. R. Johnson, in the chair. A very pleasant evening was spent in listening to a selection of songs, recitals and pianoforte solos, ably rendered by several lady friends and members.

The next meeting will be held on Thursday, December 12, when a paper will be read by the President, Mr. H. Wyatt, on "Some Dry Reactions of Simple Salts." There will also be a discussion upon the sale of poisons question.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The second "Musical Evening" took place in the Association's Rooms, 74, Commercial Street, on Thursday, Nov. 28. There was a large attendance of members and others. The Vice-President occupied the chair.

The arrangements of the evening were in the hands of Mr. T. C. Henderson, who provided an excellent programme of both vocal and instrumental music, also one or two readings and recitations, and altogether a verg pleasant evening was spent, and the usual votes of thanks brought the meeting to a close.

The next meeting of the Association takes place on

December 12. The work on the syllabus is "Short Papers by Members." These have been arranged by the Secretary, Mr. T. C. Henderson, and are as follows:—1. Short Note on Pill Coating, by Mr. Isaac Hyslop. 2. Short Note on Infusions, by Mr. R. M. Lindsay. 3. An Improved Formula for (*a*) Lotio Hydrargyri Nigra, (*b*) Lotio Plumbi c. Opio, by Mr. T. C. Henderson.

The apprentices' prize essays will also be read.

ABERDEEN CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The third meeting of the session was held in the Music Hall, on Friday, November 29, Ex-Bailie-Paterson in the chair. The subject for the evening was a lecture by Mr. W. L. Howie (Barron, Harveys and Co.), entitled "Ten Days on the Hardanger." The lecture was delivered in a very lucid and graphic manner, each point of interest being illustrated by a dissolving view taken by Mr. Howie himself. Ninety-six views in all were exhibited, many of them being enthusiastically cheered, one view especially, showing the interior of a Norwegian pharmacy, received unstinted applause.

There were about 400 ladies and gentlemen present, and the prolonged applause bestowed on the lecturer at the close indicated the great amount of pleasure he had given.

Mr. Paterson moved a vote of thanks to Mr. Howie, which was heartily responded to. Mr. Curtis having paid a similar compliment to the Chairman the meeting closed.

At the next meeting Mr. Clark will read a paper on "Volumetric Analysis," giving experimental illustrations.

Proceedings of Societies in London.

CHEMICAL SOCIETY.

(*Concluded from page* 433.)

Phosphoryl Trifluoride. By T. E. THORPE, F.R.S., and F. J. HAMBLY.—The authors find that phosphorus oxyfluoride, POF_3, may be easily and conveniently made by heating a mixture of cryolite and phosphoric oxide, and collecting the products at the mercurial trough. The interaction appears to be strictly analogous to that by which Kolbe and Lautemann obtained phosphorus oxychloride by heating phosphoric anhydride with common salt; $2P_2O_5 + 3NaCl = POCl_3 + 3NaPO_3$ (*Ann. Chem. Pharm.*, cxiii., 240).

Acetylation of Cellulose. By C. F. CROSS and G. T. BEVAN.—By heating cotton cellulose with acetic anhydride and zinc chloride (Frachimont, *Ber.*, 12, 2059), the authors have obtained a product which, judging from the results of analysis and the proportion of acetic acid which it yields when submitted to alkaline hydrolysis, appears to be a *pentacetyl* derivative of cellulose; the yield was found to be 83 per cent. of that calculated for a pentacetate, and the insoluble product of hydrolysis exhibited the behaviour of a normal cellulose. The compound is very stable, being reprecipitated unchanged from its solution in a mixture of nitric and sulphuric acids. It would appear therefore that all the oxygen of the cellulose molecule acts as hydroxylic oxygen. In discussing the bearing of these results, it is pointed out that the evidence upon which substitution of OH in the cellulose molecule has been assumed to be at a maximum with the triacetate (Schutzenberger) and trinitrate, is insufficient. Franchimont's representation of the molecule of cellulose as an aggregate of "glucose" groups, condensed according to the equation

$$n(C_6H_{12}O_6)—(n—1)H_2O$$

is based upon strong evidence, but affords no suggestion of the mode in which the condensation takes place. The extreme inertness of cellulose, as evidenced by the fact that it does not interact with acetic anhydride at its boiling point, but only at a temperature of 180°; its resistance to the powerfully hydrolytic action of acid sulphites at high temperatures; together with the results detailed in this communication, go to show that it is probable that cellulose represents a type of carbon compound *sui generis*.

Dr. Armstrong remarked that present ideas as to the constitution of cellulose are mainly an extension of our views concerning carbohydrates of the cane-sugar and dextrin-groups; we are accustomed to regard these latter as etheric-derivatives of the glucoses, and to look on cellulose as a compound of a somewhat similar type. But its physical properties, its behaviour on acetylation, and the peculiar condition under which alone it undergoes hydrolysis serve to indicate that perhaps it is a compound of a different and special type, as the authors of the paper suggest may be the case. In seeking to formulate the constitution of cellulose, the possibility that it may even be a closed chain compound should not be entirely overlooked, the occurrence of compounds such as inosite and quinic acid—both derivatives of hexhydrobenzene—in plants being not without significance from this point of view.

Action of Light on Moist Oxygen. By ARTHUR RICHARDSON.—The author finds that the presence of liquid water very much facilitates the oxidation of many substances under the combined influence of sunlight and oxygen. If, however, the water is present as aqueous vapour, the decomposition is exceedingly slow, and in some cases is entirely arrested. He finds that peroxide of hydrogen is formed when water containing pure ether is exposed to light in an atmosphere of oxygen; on shaking some of the ether with a solution of potassium bichromate, the ether at once assumed a decided blue colour. From an extended series of experiments the following facts have been observed:—(1) The amount of hydrogen dioxide formed depends on the proportion of ether to water present. (2) No dioxide is formed when a mixture of water vapour, ether vapour and oxygen is exposed to sunlight. (3) No dioxide is formed when water and ether are exposed in an atmosphere of carbon dioxide. (4) No iodine is liberated from potassium iodide by a mixture of water, ether and oxygen from which light has been excluded. On exposing pure water, acidified with pure sulphuric acid, to light, hydrogen dioxide was found in the solution; this was estimated by permanganate of potassium. Water exposed to rays of low refrangibility gave no hydrogen dioxide. On placing water which contained the dioxide, immediately after exposure to light, in the dark, it was found, after some time, to be free from dioxide; but hydrogen dioxide was formed on again exposing the solution to light; this process could be repeated indefinitely. From these and other experiments the author is led to believe that the oxidation of substances under the influence of light involves in many cases initially an oxidation of water to hydrogen dioxide, and that the oxidation of the compound is the result of a secondary interaction between it and the hydrogen dioxide.

Dr. Armstrong said that it had long since been stated that peroxide of hydrogen was formed when ether and water was exposed to atmospheric oxidation. Mr. Kingzett had brought the subject under the notice of the Society several years ago (cf. *Chem. Soc. Journ.*, Abstr., 1877, p. 183). Dr. Richardson assumed that the water was directly oxidized; Mr. Kingzett had argued—and in the case of turpentine had adduced weighty experimental evidence—that the hydrogen peroxide was a secondary product, formed by

the action of water on an organic peroxide. It was impossible to say from Dr. Richardson's results which explanation was the correct one; perhaps neither was wholly correct, as it was not impossible that the conjoint influence of the water and ether was an essential feature of the interchange with oxygen. Dr. Richardson had added ether or sulphuric acid with the object of protecting the peroxide from decomposition; surely weak solutions of hydrogen peroxide were not so unstable that proof could not be obtained of its formation if it really were produced on exposing water and oxygen to light. There was no satisfactory evidence that it was formed in the absence of a third substance. In the case of the experiments made without ether, it was just possible that the minute amount of organic matter present in the water—perhaps that derived from stoppers—had been effective in promoting peroxidation; the disappearance of the peroxide in the dark tended to favour this view.

Professor Thorpe said that he had recently had occasion to satisfy himself that water played an important part in promoting peroxidation. It had long been known that the atmospheric so-called ozone reactions were at least principally due to hydrogen peroxide. Finding in the Admiralty instructions the statement that the air of the Hebrides was said to contain more ozone than any air in the world, he had during a recent yachting tour there exposed Schönbein paper at various distances above sea level. He had always found that after six hours' exposure the "ozone" manifestations were very much stronger 5 or 6 feet above the sea than some distance above the sea, at the mast-head of the yacht.

Professor Ramsay drew attention to the fact that when a substance capable of destroying hydrogen dioxide was present, the peroxide might be formed and immediately thereafter destroyed. Such was probably the case in polluted rivers; and it might well be that the continual formation and decomposition of hydrogen peroxide was the effective cause of the oxidation of organic matters in waters. Its formation apparently tended towards a maximum, which in presence of matter capable of decomposing it would never be reached.

Mr. Groves remarked that weak solutions of hydrogen peroxide were by no means unstable, but would keep for months.

Professor Dunstan asked whether Dr. Richardson had proved that the oxidizing substance was hydrogen peroxide. He had made a series of experiments which showed that it was not formed when *pure* ether was used, although a substance was produced which was capable of liberating iodine.

Dr. Thorne, referring to the possible effect of a third substance in influencing oxidation, said that he had had occasion to observe that in bleaching coloured fibres a solution of 75 per cent. strength of hypochlorite in presence of oxygen gave the same results as one of 100 per cent. strength used alone.

The question was asked whether the precaution had been taken in the experiments with potassium iodide to exclude carbon dioxide from the air.

The President said that in experiments which he and Captain Abney had made together on the fading of water colours, the action of aqueous vapour had been most strikingly apparent; colours were found to be stable on exposure to light in dry air which were considerably affected when aqueous vapour was present.

Dr. Richardson, replying, said that the bichromate test indicated that the substance formed in presence of ether was hydrogen peroxide. Using pure water, he had obtained traces of peroxide, which, however, could not be estimated. In some cases the bottles in which the exposure to light was effected were provided with glass stoppers. He thought that very little was known as to what happens when iodine separates from potassium iodide: the solution does not exhibit an alkaline reaction.

αβ-Dibenzoylstyrolene and the Constitution of Zinin's Lepiden Derivatives. By FRANCIS R. JAPP, F.R.S., and FELIX KLINGEMANN, Ph.D.

Ethylic $\alpha\alpha_1$*-diacetyladipate.* By W. H. PERKIN, junr., Ph.D.

Action of Dehydrating Agents on α-ω-diacetylpentane. Formation of methylethylhexamethylene. By F. STANLEY KIPPING, Ph.D., D.Sc., and W. H. PERKIN, junr., Ph.D.

Action of Reducing Agents on α-ω-Diacetylpentane. Formation of Dimethylheptamethylene. By F. STANLEY KIPPING, Ph.D., D.Sc., and W. H. PERKIN, junr., Ph.D.

Oxyamidosulphonates and their Conversion into Hyponitrites. By EDWARD DIVERS, M.D., F.R.S., and TAMEMASA HAGA, F.C.S.

The Alloys of Lead, Tin, Zinc and Cadmium. By A. P. LAURIE.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, Nov. 28, Mr. E. White, Vice-President, in the chair.

The first paper read was on "Joule and his Work" by Mr. H. W. K. Pears, who gave a sketch of the life of the eminent physicist and described his principal contributions to science; more particularly the experiments by which he determined the mechanical equivalent of heat were described in detail and illustrated by diagrams.

After a discussion on Mr. Pears's paper a report on Materia Medica was given by Mr. A. E. Chaston. The subjects dealt with comprised the production of iodoform from acetone; the composition of oil of ground nut and the distinction between oleic acids of animal and vegetable origin; salicylates of mercury; mandragorine, an alkaloid obtained by Herr Ahrens from mandragora root; a test for the purity of cocaine, proposed by Dr. Stockmann, which consists in heating with strong hydrochloric acid, when, if pure, only a yellow colour is produced, while the presence of isatropylcocaine produces a brown or black colour; the relative activity of different kinds of "digitalin;" and the composition of senegin, the glucoside of *Polygala Senega*.

The report gave rise to a discussion in which the Chairman, Secretary, Messrs. Ough, Smith, Pears, and Sherlock took part.

The following short note was then read by Mr. E. Le Cudennec.

NOTE ON "LIQUOR MAGNESII CITRATIS."

The B. P. method of preparing this liquor consists in dissolving carbonate of magnesia in a solution of citric acid, adding syrup of lemons, and lastly crystals of potassium bicarbonate just before corking the bottle; on shaking the mixture solution of the crystals is effected.

The method which I have been accustomed to employ in Mauritius presents two advantages.

I. Economy of time, which is a consideration in view of the fact that this preparation has generally to be prepared extemporaneously.

II. The compounder is exposed to less risk from the bursting of faulty bottles.

Into the bottle introduce the bicarbonate of potassium in powder; on this pour the syrup and then gently the solution of magnesium carbonate in citric acid (prepared as the Pharmacopœia directs). The syrup forms a stratum between the bicarbonate and the acid solution, preventing reaction whilst the cork is inserted and secured.

The bottle is then enveloped in a cloth and slowly shaken.

I employ simple syrup in place of the syrup of lemon, adding a few drops of tinctura limonis recentis before corking. An equally good product with an economy of time, to the extent of about six minutes, is secured by this modification.

A question as to the removal of marking ink stains was raised by Mr. Ough and discussed by Messrs. Cranstone, Sherlock and Smith.

The Secretary announced that the Executive Committee had appointed the following Committee of Reporters on science:—

Pharmacology, Miss M. E. Buchanan; Practical Pharmacy, Mr. F. C. J. Bird; Botany, Mr. R. H. Norman; Materia Medica, Mr. A. E. Chaston; Physics, Mr. E. J. Eastes; Organic Chemistry, Mr. A. C. Stark; Inorganic Chemistry, Mr. L. W. Hawkins; Analytical Chemistry, Mr. C. G. Willsher.

The meeting then adjourned.

Obituary.

Notice has been received of the death of the following:—

On the 21st of November, Mr. John Bonny, Chemist and Druggist, Market Street, Blackpool, Lancs. Aged 43 years.

On the 27th of November, Mr. John Mead Frank, Chemist and Druggist, late of Shaw Street, Liverpool. Aged 50 years.

On the 27th of November, Mr. William Boden, Chemist and Druggist, Exmouth Villas, Teddington. Aged 56 years.

On the 1st of December, Mr. William George Jackson, Pharmaceutical Chemist, Northgate, Hartlepool. Aged 78 years. Mr. Jackson had been a member of the Pharmaceutical Society since 1842.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The Sale of Medicated Wines.

Sir,—With reference to the medicated wine question, which has been under discussion by the N. B. Executive, perhaps the enclosed letter that I have just received from the Board of Inland Revenue may be of interest.

It was reported that in certain districts of Scotland chemists were threatened with prosecution, by officious and over-zealous excise officials, for selling, among others, pepsine wine, without holding a wine license.

To test the matter, I prepared a list of all the Pharmacopœial wines, along with pepsine wine, giving strength, wine used, and dose, and forwarded the same for advice to the Board of Inland Revenue, Somerset House. I received a prompt, courteous reply, requesting me to send full recipe for pepsine wine, a label, price at which it was retailed, along with a sample of the wine for analysis. To all of these particulars attention was given in my reply note. The recipe given was as follows:—

Pepsine	320 grains.
Hydrochloric acid (strong) . . .	2 drachms.
Sherry wine	1 pint.

Dose: One or two teaspoonfuls once or twice a day.

It is the reply received to this communication which I forward for publication.

Chemists interested in the sale of other medicated wines, coca for example, might with advantage do as I have done.

Dunfermline. John H. Fisher.

[*Copy.*]

"Inland Revenue,
"Somerset House, London, W.C.
"29th November, 1889.

"Sir,—In reply to your letter dated the 16th instant I am directed by the Board of Inland Revenue to acquaint you that they have instructed their local officers not to interfere with the sale by you, without license, of the medicated wines mentioned in your letter, including the 'pepsine wine,' so long as its present composition is retained.

"I am, Sir,
"Your obedient servant,
(*Signed*) W. B. Heberden,
"*Assistant Secretary.*"

"Mr. John H. Fisher.

Lime Water.

Sir,—Permit me to briefly reply to the letter of Mr. A. C. Abraham in Journal of 30th ult.

If he refers to my paper again he will find the conditions mentioned under which a supersaturated solution of calcium oxide can be obtained, he will also find by reference to the table that I did not obtain a commercial specimen of that strength, and neither do I think that such could be maintained under the ordinary circumstances of the pharmacy.

My remarks upon the point are based upon a paper appearing in *Pharm. Centralh.* (vol. xxvi., pp. 442-446 and 455-457), by A. Goldammer. An abstract appears in *Journ. Soc. Chem. Ind.* (vol. v., p. 450), from which I take the following quotation:—"A large number of experiments show that while calcium oxide possesses in a marked degree the property of forming supersaturated solutions, calcium hydroxide does not. Solutions supersaturated at a low temperature contain about 2·4 grams per litre."

A paper in the *Journal of the Chemical Society* for 1888, page 500, gives the solubility of CaO in water at 19° C. as 1 in 640, or about 1·37 grains per ounce.

I think it would be a decided advantage to your readers if Mr. Abraham, instead of "confidently predicting," would practically ascertain the truth of these statements and then give the facts.

By a further reference to my table it will be observed that samples of lime water requiring oxalic acid in excess of B. P. figures did contain traces of impurities; in one instance chlorides, in the other magnesium. I have never analysed a sample containing any large quantity of potash or soda.

The method adopted by Mr. Abraham in using his lime continuously for making lime water yields him different results to what it has me, although he does not state whether the lime water is drawn off soon after making, or only as required for use; as, on the authority of Lamy the longer the lime and the water remain in contact, the less calcium oxide is dissolved.

I have carefully read Mr. Abraham's paper in volume xiii. of the *Pharmaceutical Journal*, and do not see that it bears upon the points at issue in his letter; he there recommends washing the lime, a point mentioned by the Pharmacopœia, and also emphasized in my paper.

T. A. Ellwood.

Sir,—As far back as the year 1850, in the *Pharmaceutical Journal* of that year (vol. ix., 1st series) data were given, comprised within seven lines, which to one who deserves the title of "chemist" are enough that he may ensure a continuous supply of lime water of the standard strength and goodness.

Why are we ordered to waste a lot of "Holy Water" in cleaning a nasty impure article, when this may be obtained ready for our use free from all impurities whatever?

I make always quite 50 gallons of liq. calcis from a pound of lime. Why should I not, seeing that I use pure calcis hydras, prepared for me by the manufacturing chemist, and aqua pura bright and fresh, usually drawn over by myself? I could even, in such cold weather as this is, imitate successfully the prevalent mountebankism and advertise liq. calcis conc. one, two, or even three, without fear of the consequences.

With respect to the uncertainty in the value of lime water the pharmacist is much to blame—the pharmacist

of yesterday, I mean, because he paid too much attention to the dispensing doctor of the day before. This old-fashioned specimen used to send his errand boy to run and catch what he could of calcium oxide from a passing builder's cart, tumble it into a pailful of ordinary water, stock it in the black bottles round the top of the shop—so as to keep it warm—and take his ease.

I would not, Sir, mention these facts but for another, that even now the poor people in some parts of London are advised by their benevolent medicus to get a lump of lime and stir it in a few quarts of water, to be used for mixing with baby's food, instead of buying it at what is branded as an exorbitant price, 4*d*. or 6*d*. a pint.

What should we have been without the Pharmaceutical Society? Well, none can tell what would have been, if what is was not; the sheet anchor this, it seems to me, of these who, with such beautiful simplicity, are ever asking "What has the Pharmaceutical Society done for us"?

J. C. Hyslop.

Allium Sphœrocephalum.

Sir,—I may perhaps be allowed to remark, with reference to the botanical notes just published by Messrs. Baxter and Balkwill, that the Allium they mention as growing at the Lizard and elsewhere on the Cornish coast is not *A. sphœrocephalum*, L.

The Cornish plant belongs to another section of the genus, and differs, among other characters, in its simple, distinct stamens, and large heads. It is *A. sibiricum*, L.

The only British stations for *A. sphœrocephalum* are at Bristol, on St. Vincent's Rocks and Durdham Down.

James W. White.

Euonymus Bark.

Sir—The paper on "Chemical Observations on the Root Bark of Euonymus," read by Messrs. Naylor and Chaplin at the last Conference, shows some excellent work on a drug whose composition has hitherto been imperfectly revealed by investigation, and taking advantage of the provisional naming of a newly described substance I would express a hope that the name may never come into general use. These chemists have isolated a white crystalline body from the aqueous extract of root bark, and call it "atropurpurin." My objections to this name are the following:—(1) The name "atropurpurin" would convey the idea that it has some relation to purpurin, an anthraquinone derivative having pigmental properties; to apply such a term to a white crystalline body not reddened even by sulphuric acid is misleading if not injurious. (2) The name evidently rests upon the specific name of the plant, and in that case the substance should be the active principle of the plant or something peculiar to that species, but neither of these possibilities has been proved.

My interest in the subject is due to my having recently examined the barks of two species of Indian euonymus, *E. pendulus*, a Himalayan tree, and *E. crenulatus*, growing on the Nilgiri Hills. Both barks were astringent, on account of the presence of tannic acid, and the aqueous extracts were highly crystalline. The crystals were neutral in reaction, sweet to the taste, negative towards alkaloidal reagents, fused when heated, contained no nitrogen, and were dissolved by boiling rectified spirit, from which they solidified on cooling. Kubel in 1862 found in the bark of *E. Europœus* a saccharine crystalline substance closely resembling mannite, but differing in melting point and crystalline form, and it is worth noting that the melting point, 182° C., of the crystals found by Messrs. Naylor and Chaplin is identical with that of dulcite, an isomeride of mannite.

D. Hooper.

Old Medicine Jars.

Sir,—It may be interesting to see a brief notice of some of the "simples" that were used in their medical practice by the monks of Italy in the 16th century. My information is derived from old medicine jars taken out of suppressed monasteries, and now forming part of a collection of *Faience* and *Urbino* ware in the National Museum at Florence. The jars are of two sizes, holding respectively two and four quarts, and are of the usual elegant shape of waterpots in this country, with two handles and a short spout like that of a teapot. All are tastefully, though not very artistically painted in colours on a white ground, and bear as their device the figure of a monk holding in his hand the particular flower or herb that forms the chief ingredient of the medicine.

The larger jars, why, I know not, bear on their front a bust portrait of some Pope, and most of these are not labelled. The labels are painted near the base of each jar, and give the Italian names of their contents, with many abbreviations not always easily decipherable. One especially, which I give *literatim*, was very difficult to interpret:—

SŸ D POMS GPT.

These letters, I have ascertained, stand for "Syropo di Pomi Composito," or Compound Syrup of Apples.

With a few exceptions all the names are of distilled waters of the following indigenous plants:—Orange flowers, parsley, endive, betony, broom, chicory, blackthorn, borage, hollyhock, pimpernel, hops, couchgrass, liverwort, sage. The exceptions are the before-mentioned syrup, a plaister of melilot, and a distillate of snails.

Beside these jars I remarked a very large and handsome vase holding perhaps four or five gallons, which had the place of honour assigned to it in the middle of the saloon. It differed from the other jars in having four beautifully modelled handles, no spout, and a slightly conical bronze lid, and but for the medical label on the base it might have been intended for some nobler use. Curiously enough this last named jar has precisely the same shape as an Etruscan urn found in one of the tombs at Chiusi, which is made of black clay and ornamented with figures of animals in low relief. The label of the medicine jar has the words TERIACA MAGNA, which is an electuary still used by old-fashioned people. It is a modernized form of the ancient "Mithridate," and is a wonderful farrago of drugs according to the formula given in an old pharmacopœia, which includes the following:—Squill, iris, ginger, gentian, calamus aromaticus, spikenard, valerian, scurvy grass, dittany, canella, red rose leaves, saffron, long pepper, aniseed, cardamom, myrrh, bitumen judaicum, castoreum, extract of opium, storax, and desiccated sulphate of iron. These ingredients are to be finely powdered, and well mixed with honey and white Spanish wine.

In my opinion the interest attaching to these 16th century ceramics is not so much in the light thrown on the pharmacy of that period, as in the evidence they afford of an æsthetic taste which could invest articles in daily use with a grace and dignity that compare favourably with the practice of our own times.

Guildford. Henry Taylor.

Apprentice.—There are two "Bell Scholarships," each of the value of £30, in addition to free laboratory instruction and admission to the lectures. They are awarded on the results of an examination, and are tenable for one year. Candidates must be Registered Students or Apprentices of the Society, of not less than twenty or more than twenty-two years of age on the day on which the examination is held, and have passed not less than three years in the pharmacy of a registered chemist and druggist. Further particulars will be found in the Society's Calendar.

Indignans will find some useful information as to the views of the Inland Revenue authorities respecting medicated wines in the letter from Mr. J. H. Fisher, printed on the preceding page.

J. F. Brown.—In your interest we regret that the satisfaction of your professed preference should be interfered with by anything so unfounded as the opinion you appear to entertain.

Mr. Arnold Graves, Honorary Secretary to the City of Dublin Technical Schools, writes to dispute the statement in the letter of Mr. Patrick Kelly, referred to in the report of the meeting of the Council of the Pharmaceutical Society of Ireland (see before, Nov. 16, p. 393), that there is only one school in Dublin, and that a day school, at which students can take out the one hundred hours' laboratory practice required by the Pharmaceutical Society of Ireland. As a committee has been appointed to consider the subject referred to in Mr. Kelly's letter, we suggest that Mr. Graves would do best to put himself in direct communication with that committee.

Communications, Letters, etc., have been received from Messrs. Merck, Cripps, Davis, Pollard, Welborn, Munro.

ON SCOPOLA CARNIOLICA.*

[*Communication from the Research Laboratory of the Pharmaceutical Society.*]

INTRODUCTORY.

BY PROFESSOR W. R. DUNSTAN.

Rather more than a year ago Mr. Ransom brought under my notice a rhizome which had recently appeared in the drug market, being offered as a substitute for the root of *Atropa Belladonna* under the name of *Belladonna Scopolia*. It was imported from Germany, and was stated to grow wild in the Carpathian Mountains and in other parts of Austro-Hungary. The juice of the plant was supposed to possess mydriatic properties. From further inquiries it appeared that an abundant supply of the plant could be obtained should any demand arise for it.

Two species of *Scopola* have already been made the subject of chemical investigation, viz., *Scopola japonica* and *Scopolina Hladnikiana*; *Scopola japonica* has been used to some extent in medicine. The new rhizome was not, however, likely to be derived from either of these plants, since the first is indigenous to Japan and does not grow in Europe, while *Scopolina Hladnikiana* is rare and practically unknown outside the botanic garden.

Having regard to the probability that the plant might contain one or more of the mydriatic alkaloids and to the commercial scarceness of their principal source, *Atropa Belladonna*, it seemed desirable to make a chemical examination of the rhizome, and if constituents were discovered likely to possess valuable medicinal properties to submit preparations made from the plant to therapeutical examination. Chemical investigation soon showed that we have in this plant a new and important source of hyoscyamine.

Dr. Lauder Brunton undertook to try the therapeutic effect of the drug, but unfortunately was compelled by pressure of other work to abandon the experiments before they were completed. As far as these experiments were carried they seem to show that galenical preparations made from this rhizome possess properties similar to, if not identical with, those of belladonna. In order that the therapeutic action of this species of *Scopola* might be well established, Sir Dyce Duckworth has made a further series of trials of galenical preparations prepared by Mr. Ransom, and standardized to correspond with those of belladonna. The results of these experiments are recorded by Sir Dyce Duckworth in a paper printed on p. 466.

The pharmacy of the plant has been very fully worked out by Mr. Ransom, who describes in a paper printed on p. 464 the methods of preparing standard galenical preparations.

Since it is important that the plant from which the rhizome is derived should be identified and described, Mr. Holmes has investigated the subject, and has been able to refer the rhizome to *Scopola carniolica*, a plant which grows freely in several parts of Europe, notably in Austro-Hungary. A full account of the plant is given by Mr. Holmes in the paper printed on p. 468.

The remarkable resemblance between *S. carniolica* and *Atropa Belladonna*, which the chemical investigation has disclosed, suggested a comparison of the histological characters of the rhizome of the one plant with the root of the other. This comparison has been made by Mr. Greenish, whose description is given, together with woodcuts of the two sections, on p. 471.

The chemical examination of all the constituents of this plant is not yet quite complete, although the most important have been minutely studied. We think it desirable to publish our present results without delay, since it appears from an announcement in a recent number of a German periodical that at the meeting of the Naturforscher Verein at Heidelberg Professor Schmidt, of Marburg, stated that he is working at a species of *Scopola*, which seems likely to be the same as that we have investigated.

* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, December 11.

ON THE CHEMICAL CONSTITUENTS OF SCOPOLA CARNIOLICA.*

BY PROFESSOR W. R. DUNSTAN AND A. E. CHASTON.

Two species of *Scopola* have been chemically studied. *Scopola japonica* by Lanngaard (*Pharm. Journ.*, [3], xi., 10), by Eykman, and later by Schmidt and Henschke (*Archiv d. Pharmacie*, 1888, 185). The root of this plant is shown by Schmidt and Henschke to contain atropine, hyoscine and hyoscyamine. The so-called "scopoleine," once thought to be a distinct alkaloid, contained in *Scopola japonica*, is a mixture of these bases. Besides these alkaloids the plant contains a fluorescent substance scopoletin, and a fat which is said to be composed of the glycerides of stearic, oleic and palmitic acids.

Scopolina Hladnikiana, a rare plant remarkable for its green flowers, has been partially investigated by Schmidt (*Archiv d. Pharmacie*, 1888, 214), who found it to contain hyoscyamine, but was unable from lack of material to complete his examination of it.

Extraction of the Rhizome.—Having in a preliminary experiment ascertained the presence in the root of what was probably a mydriatic alkaloid, and being aware of the ease with which the mydriatic alkaloids are changed or decomposed, great care was taken in extracting the constituents from the rhizome, and also in dealing subsequently with the alcoholic extract to avoid heating the material above 50° C. The rhizome having been air-dried at a low temperature was finely powdered and completely exhausted by percolation with cold alcohol. This process was carried out for us by Mr. Ransom. The percolate from nearly 5 kilos of the rhizome was evaporated at 30°–40° C., by which means a semi-fluid mass containing much fat was obtained. This residue was incorporated with water containing one per cent. of hydrochloric acid and slightly warmed. The fat was now separated and the resulting acid liquid repeatedly extracted with chloroform until nothing further was removed. The liquid having been rendered alkaline by the addition of very dilute ammonia the alkaloid was removed by agitating the liquid with chloroform.

Examination of the Alkaloid.—By the spontaneous evaporation of the chloroform a coloured mass was

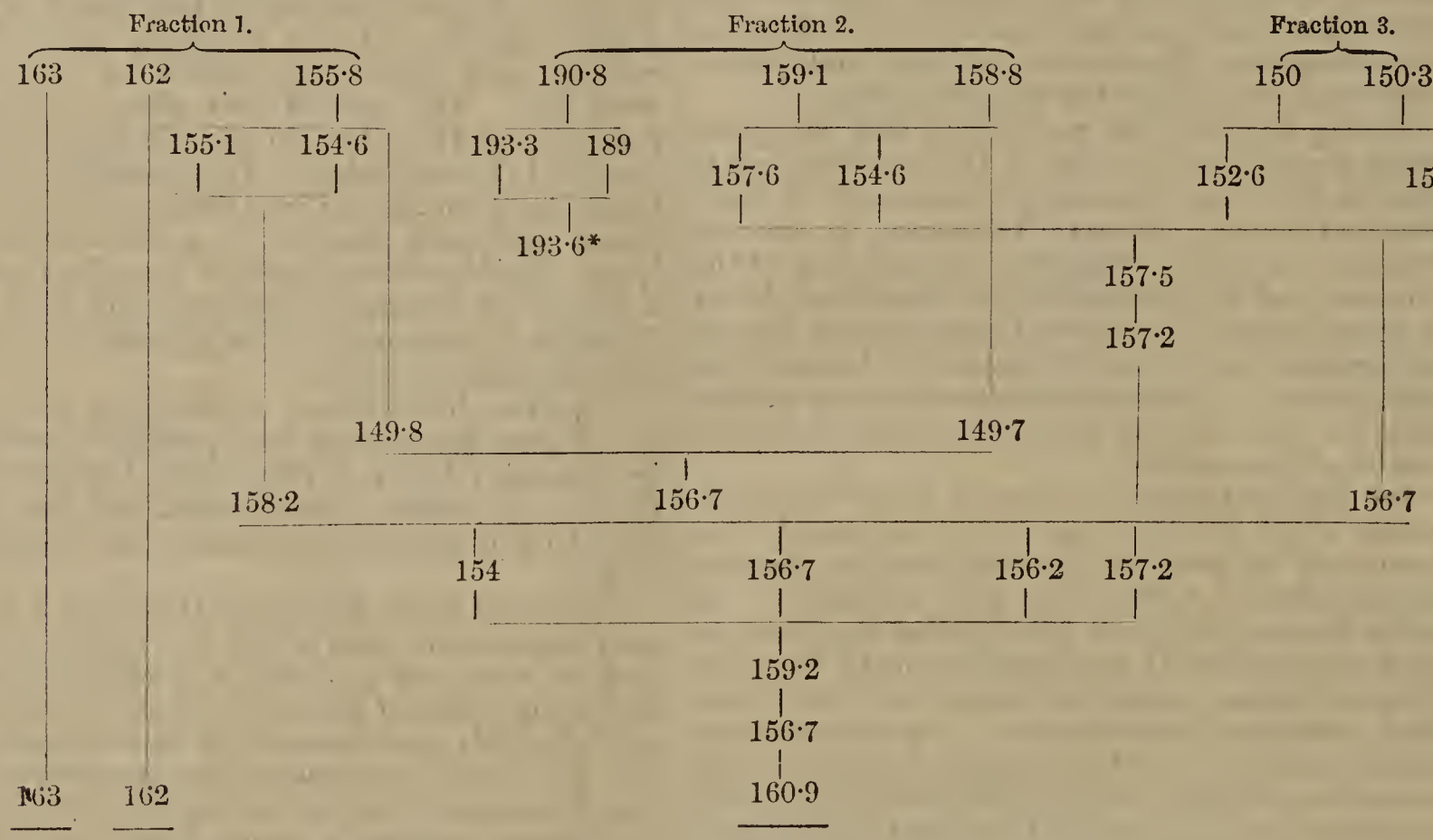
* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, December 11.

obtained. This was dissolved in very dilute hydrochloric acid, the liquid again rendered alkaline with weak ammonia and the alkaloid extracted by repeated agitation of the liquid with ether. The residue left by the evaporation of the ethereal solution was dried over sulphuric acid in a vacuous desiccator and then dissolved in pure anhydrous ether. By the gradual spontaneous evaporation of the ether large silky needle-shaped crystals were deposited. These were removed, drained free from adhering ether, and dried in a vacuous desiccator, after which they were repeatedly recrystallized from pure ether. The alkaloid now melted at 108·4 (corr.) and possessed all the properties of pure hyoscyamine.* From the original ethereal solution a second deposit of crystals was obtained. These were recrystallized, and then were observed to melt at 107·7° C. A third fraction was deposited from the same liquid, which when recrystallized melted between 106°-107° C. By combining these three fractions and recrystallizing them from ether, a group of large silky needles was obtained melting at 108·5° C. Pure hyoscyamine melts at 108·5° (Ladenburg).

The remainder of the ethereal solutions was spontaneously evaporated, when a slightly coloured residue remained. In order to ascertain whether either atropine or hyoscine was contained in it, the substance was dissolved in dilute hydrochloric acid and fractionally precipitated with a solution of gold chloride ; the different fractions of aurochloride thus produced were repeatedly recrystallized from water, and acidified with hydrochloric acid until fractions having constant melting points were obtained. This method is long and tedious, but it is the only one which would serve to detect the presence or absence of the other mydriatic alkaloids ; it is the plan which was adopted by Ladenburg in his well-known researches on these bases. The results afforded by this process of fractional precipitation and crystallization are tabulated in the following diagram (I). The fraction of

Fractional Precipitation and Crystallization of Aurochlorides.

I.



* ? Hyoscine. Minute quantity insufficient for recrystallization.

aurochlorides resulting from three successive precipitations of the liquid with gold chloride were repeatedly crystallized until the melting point of the salt was not altered by further treatment. For example, when a small quantity of a solution of gold chloride was added to the acidified solution of the alkaloid a precipitate was obtained (Fraction 1). This precipitate was dissolved in warm water acidified with hydrochloric acid. From the solution crystals soon separated, which were removed, washed with acidulated water and dried. These crystals melted at 163°. After evaporating the liquid to a slight extent more crystals were deposited, which were likewise removed, washed and dried. The melting point of this second deposit was 162°. The liquid when further evaporated yielded a third deposit of crystals melting at 155·8°. The crystals melting at 163° and 162° respectively, were not appreciably affected by recrystallization, but that melting at 155·8° was separated by recrystallization into two small fractions, the one melting at 155·1° and the other at 154·6°. These fractions were too small to be recrystallized by themselves and they were therefore retained and subsequently dissolved and recrystallized with later fractions having about the same melting point ; it will be seen from the diagram that these crystals ultimately afforded an aurochloride melting at 160·9° and not changed by further treatment. By pursuing this method the three original fractions, by repeated crystallization, were resolved into aurochlorides melting at 163°, 162° and 160·9° respectively ; the mean of these numbers is 161·9°, a constant which agrees well with the melting point

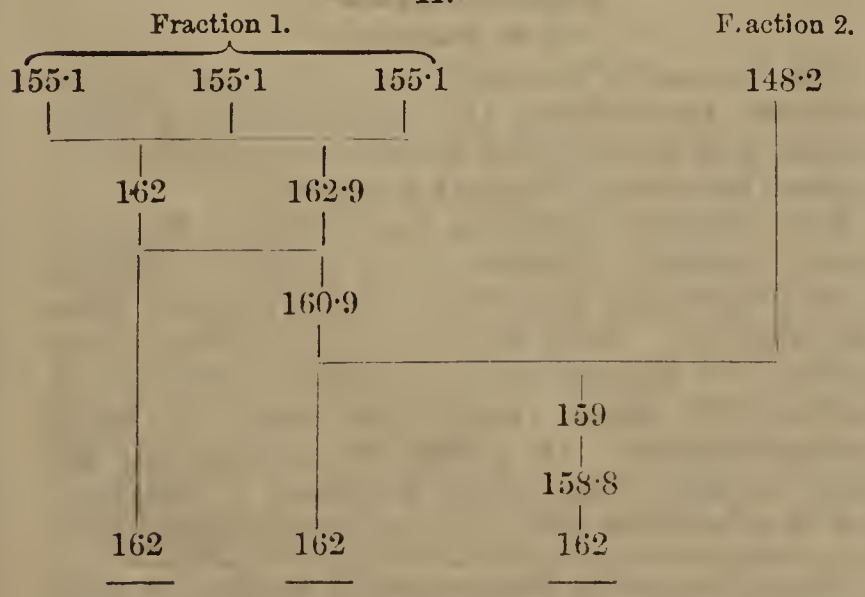
* The determinations of all the melting points recorded in this paper were taken with a thermometer which had been recalibrated against a standard, and the readings have in all cases been subjected to Regnault's correction for exposed stem.

of hyoscyamine aurochloride, which is stated to be between 159°–162° (Ladenburg and Will). These crystals were in fine golden yellow scales. Employing Dumas' method the amount of nitrogen contained in the salt and also the amount of gold (by weighing the residue left after the combustion) were determined. The combustion was conducted in a vacuum and the nitrogen collected through the limb of a Sprengel pump. Percentage of nitrogen found = 1·9; percentage of gold = 31·27. Calculated for hyoscyamine aurochloride, nitrogen, 2·2 per cent., gold, 31·3 per cent. There is no doubt, therefore, that the alkaloid is hyoscyamine. It remains to notice one fraction of the aurochloride which melted at 190·8° and after recrystallization at 193·6°. Of the many specimens of aurochloride we examined only this minute portion melted at this temperature and the quantity was so small that we were unable to examine it further. It is possible that it may have contained hyoscine aurochloride, which melts at 196°–198°.

The whole of the alkaloid obtained from the rhizome had now been exhaustively examined with the exception of that which remained dissolved in the alkaline liquid even after repeated agitation with ether. Since ether is soluble in water it is hard to completely remove a substance from its aqueous solution by shaking it with ether, even when the substance is very soluble in this liquid. After the ether had been expelled, the solution was acidified and precipitated with a solution of iodine in potassium iodide, the resulting periodide of the alkaloid was collected, washed and decomposed with a solution of sodium thiosulphate, from which liquid, after the addition of ammonia, the alkaloid was removed by agitation with chloroform. The residue left by the evaporation of the chloroform was in a fused and uncrystalline condition; but when dissolved in dry ether crystalline alkaloid was deposited, and after recrystallization melted at 106-108°. The part which remained dissolved in the ether was dissolved in diluted hydrochloric acid and fractionally precipitated with a solution of gold chloride. The fractions of aurochloride were then crystallized until they possessed constant melting points. The results of the process of fractionation which are tabulated in the diagram (II.) reveal the presence of no other alkaloid than hyoscyamine.

Fractional Precipitation and Crystallization of Aurochlorides.

II.



At the conclusion of the two processes of fractional precipitation (Diagram I. and II.) the liquids from which the separate fractions had been deposited were evaporated to a very small volume, but with the exception of a few more crystals melting at 155° (which were mixed with other fractions and recrystallized), nothing was obtained, and on evaporating to dryness a residue of gold chloride remained. From some experiments that were made in the course of this inquiry it appears that the melting point of hyoscyamine aurochloride undergoes a marked diminution when the salt is deposited from a solution containing excess of gold chloride, owing no doubt to the action of occluded gold chloride.

Of the known mydriatic alkaloids *Scopola carniolica* is thus shown to contain only one (hyoscyamine) in any appreciable quantity; there may also be present a minute amount of hyoscine, although we were unable to conclusively prove this to be the case. *Scopola carniolica* appears to be distinguished from other plants which yield mydriatic alkaloids in containing hyoscyamine in an almost, if not quite pure condition. It must, however, be borne in mind that in investigating the alkaloidal constituents of this plant advantage has been taken of the facts recently established with reference to the instability of hyoscyamine when in contact with fixed alkalis, or when heated to the temperature of boiling water. The plant was dried at a low temperature, exhausted with cold alcohol, and the alcoholic percolate was evaporated at 30°–40°, whilst no fixed alkalis were used in extracting the alkaloid. It has not yet been definitely established that atropine is actually present in belladonna, or, indeed, in any plant, and it has not yet been shown that the hyoscine which is often obtained, besides atropine and hyoscyamine, is a constituent of the plant, and has not been produced during the extraction of the alkaloids.

Examination of the Fatty Constituents.—The fatty and resinous constituents were separated as far as possible from the alcoholic extract of the rhizome, after mixing it with dilute hydrochloric acid, and the remainder was extracted by repeatedly shaking the acid liquid with chloroform. From nearly 5 kilos of the rhizome about 90 grams of fat and resin were obtained. Light petroleum dissolved about half of the mixture, leaving resin undissolved. The resin possessed the usual characters, and was not further examined. The fat was saponified by prolonged ebullition with alcoholic potash. The alcoholic liquid was then diluted with water, and the alcohol distilled from it. The aqueous solution was repeatedly extracted with ether, and the residue obtained by the evaporation of the ethereal solutions again saponified with alcoholic potash. Ether now removed a slightly coloured substance which crystallized in rosettes of fine needles. These were several times recrystallized from alcohol, by which means colourless plates were obtained, melting at 132°. They gave the characteristic colour reactions for cholesterin with sulphuric acid and chloroform, and also with ferric chloride. By drying at 100° the crystals lost 4·6 per cent. of water (calculated for $C_{26}H_{44}O,H_2O = 4·61$ per cent. of water), and the melting point of the anhydrous substance was found to be 137·5°. The dried material was dissolved in chloroform, in which it was readily soluble, and absolute alcohol was added until a slight turbidity appeared. A mass of fine needle-shaped crystals soon separated, which were anhy-

drous, and melted at 137·5°. When burned in a current of oxygen they yielded the following results :—

	Found.	Calculated for $C_{26}H_{44}O$.	Calculated for $C_{27}H_{46}O$.
Carbon . .	84·1	83·87	83·93 per cent.
Hydrogen .	12·8	11·82	11·91 ,,

which agree fairly well with the formulæ $C_{26}H_{44}O$, or $C_{27}H_{46}O$, each of which has been assigned by different observers to cholesterin. The substance is difficult to burn, and it is doubtful whether the results of combustion alone can enable us to arrive at a decision as to which formula is correct.

In order to further characterize the substance it was converted into the benzoate. This is usually effected by fusing it with benzoic anhydride. We thought that possibly the use of benzoic chloride in the manner recently suggested by Baumann and Udransky, for the preparation of the benzoic derivatives of amines might prove to be more convenient. The cholesterin was found to be readily soluble in benzoic chloride, but on decomposing the solution with soda, cholesterin and not its benzoate, was precipitated. It was observed subsequently that if the solution of the cholesterin in the benzoic chloride is heated near its boiling point for about fifteen minutes and then poured into an excess of a 5 per cent. soda solution, after shaking for some time, until the excess of benzoic chloride has been completely decomposed, the cholesterin benzoate remained insoluble. It was collected, washed and dissolved in ether. The ethereal solution was then mixed with about half its volume of absolute alcohol, in which the benzoate is almost insoluble, when a mass of crystals was obtained. These after recrystallization melted at 145·5°, and were not altered by a repetition of the process. The remainder of the ethereal solution yielded more crystals, which likewise melted at 145·5°. There was no doubt, therefore, that we were examining a single substance.

Cholesterin has been detected in small quantity in many plants. *Scopola carniolica* contains rather more than 0·1 per cent. Cholesterin from different sources does not appear to possess the same properties. Animal cholesterin (from brain and gall-stones) does not seem to be identical with vegetable cholesterin, and further, various specimens of vegetable cholesterin differ to some extent among themselves. Some of these substances are probably isomerides and homologues of cholesterin, but other specimens have in all probability not being sufficiently purified before examination. The following are the recorded properties of the principal varieties of cholesterin which have been noticed up to the present time.

Formula $C_{26}H_{44}O$ or $C_{27}H_{46}O$.

	M.P.	M.P. of benzoate.
Cholesterin (from brain and gall-stones, sheeps' wool, etc.)	146°–148°	146 –151
Iso-cholesterin (from sheeps' wool, etc.)	138°–138·5°	190 –191
Para-cholesterin (from a fungus)	134°	127°–128°
Caulosterin (from lupines) .	158°–159°	—
Daucosterin (from carrots) .	136·5°	145°
Phytosterin (from seeds) .	132°–133°; 136°–137°*	— 145°–147°
Cholesterin (from *S. carniolica*)	132°–133°*; 137·5*	145·5°.

* Anhydrous

The cholesterin from *S. carniolica* appears to resemble most nearly phytosterin and daucosterin, both of which are vegetable cholesterins. We intend to make a further study of this substance.

Cholesterin has not apparently been noticed in other plants of the sub-order *Atropaceæ*, or of the natural order *Solanaceæ*. It is remarkable that Schmidt and Henschke did not find it in *S. japonica*. As the occurrence of the substance is of some importance, especially in connection with a comparison of the chemical constituents of *S. carniolica* with those of *Atropa Belladonna*, we searched for cholesterin in belladonna root.

About 5 kilos of the roots were exhausted with alcohol. The fat was separated and saponified with alcoholic potash. The soap solution when extracted with ether afforded a crystalline substance which after recrystallization from alcohol melted at 132°, and possessed the same properties as that obtained from *S. carniolica*. The quantity of cholesterin in the root of *Atropa Belladonna* is probably not less than that in the rhizome of *Scopola carniolica*. We have not yet found an opportunity to examine *Scopola japonica* or any other atropaceous plant.

From the decomposition of the soap which had been prepared from the fat of *Scopola carniolica*, a crystalline fatty acid was obtained, which we are still engaged in investigating. The complete purification of this substance by recrystallization from alcohol has proved to be a tedious operation. It appears to be mainly, if not entirely, composed of an acid which melts between 74° and 75°, corresponding in its properties with arachic acid $C_{20}H_{40}O_2$, one of the higher members of the acetic series.

We have obtained two other constituents from *Scopola carniolica*, but have not yet been able to minutely investigate them. One is a crystalline sugar reducing Fehling's solution, and yielding an osazone which appears to be identical with that obtained from dextrose. The other is a crystalline substance whose aqueous solution is highly fluorescent, especially when alkaline. It appears to be identical with the scopoletin which Eykman obtained from *Scopola japonica* and with the chrysatropic acid which Kunz obtained from *Atropa Belladonna*. There are grounds for believing this substance to be methyl-æsculetin.

THE PHARMACY OF SCOPOLA CARNIOLICA.*

BY F. RANSOM.

The increasing demand for belladonna and its alkaloids has induced the examination of allied plants, with the object of ascertaining whether they contain the same or similar principles.

Some years ago attention was called to a Japanese plant, *Scopola japonica*, and certain alkaloids having mydriatic properties were extracted from the rhizome. Since that time a rhizome, very similar in appearance, has been offered by Continental dealers under the name of Belladonna Scopolia. It is difficult to ascertain the exact locality from which the plant is obtained, but it is believed that the commercial supply is de-

* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, December 11.

rived from Austro-Hungary, probably from some districts of the Carpathian Mountains. The samples are all very similar in appearance, and that upon which the following work has been carried out is identified by Mr. Holmes as *Scopola carniolica*. The price usually quoted is considerably less than that asked for belladonna root, and the supply appears to be abundant.

Although no details had been previously published with reference to the constituents of the plant, its similarity to the Japanese species, and the fact that it is offered as a substitute for belladonna, suggested the probability of similar properties. A preliminary examination indicated the presence of an alkaloid which powerfully dilated the pupil of the eye. Mr. Reynolds, of Leeds, has kindly supplied me with fresh and dried specimens of *Scopola carniolica*, which he has grown in his garden for some years. The juice from the fresh leaves was examined and found to contain a similar mydriatic alkaloid.

In order to compare the value of the rhizome with belladonna root, experiments were made to determine the percentage of alkaloid present. The following process for estimation was found to give satisfactory results, and is a slight modification of that proposed by Professor Dunstan and myself for the assay of belladonna (*Pharm. Journ.*, 3rd series, xiv., 623).

Twenty grams of the dry rhizome in No. 60 powder are percolated in the cold in a continuous extraction apparatus with equal parts by volume of absolute alcohol and ammoniated chloroform; about 60 c.c. of the mixture is required. When the liquid ceases to drop from the percolator heat is applied to the receiver, and the marc exhausted by hot percolation. (Exhaustion is indicated by the absence of any precipitate when a drop of solution of iodine and iodide of potassium is added to the acid solution of the residue obtained on evaporation of five drops of percolate.) The percolate is then agitated with two successive 25 c.c. of distilled water acidulated with hydrochloric acid, and separated. The mixed aqueous solutions are agitated with chloroform to remove the last traces of mechanically adherent colouring matter. The chloroform is separated, and the aqueous liquid rendered alkaline with ammonia, and agitated with two successive 25 c.c. of chloroform, which are mixed and agitated with a small quantity of distilled water, rendered faintly alkaline with ammonia, to remove adherent aqueous liquid. If the chloroform solution is still coloured, it should be again exhausted with acidulated water, from which the alkaloid is finally extracted with chloroform after the addition of ammonia. The chloroform is then evaporated spontaneously or over a water-bath, and dried at a temperature of 200° F. (93° C.). Twenty-five grams of a sample of the rhizome received from Moravia, estimated in this manner, yielded by spontaneous evaporation a light crystalline residue, very similar in appearance to that obtained from belladonna. In order to preserve its crystalline form it was dried as far as possible over sulphuric acid in a desiccator, and it then weighed ·134 grm. = ·54 per cent. It was found, however, that this residue contained water, which could only be removed by the application of heat. When heated in a drying oven for about an hour at a temperature of 100° C., a loss in weight of about 25 per cent. occurred, and the residue, now amorphous, weighed only ·108 grm. = ·43 per cent.

This is slightly higher than the average of three samples of belladonna root examined by Professor Dunstan and myself, which yielded respectively ·35, ·38 and ·39 per cent. of total alkaloid. Another sample of Scopola, received from Western Germany, but probably grown in Hungary, yielded ·51 per cent. of alkaloid. These residues were proved to consist of practically pure alkaloid, by precipitating the acid solution with iodine, filtering, washing, and dissolving the precipitate in solution of hyposulphite of sodium, and recovering the alkaloid with chloroform after the addition of ammonia.

The results of further investigations into the chemistry and therapeutic action of the drug confirm the impression that we have in Scopola a medicinal agent of considerable value. The fact of its action being dependent upon an alkaloid which can be assayed without difficulty, renders it especially adapted for galenical preparations of standardized strength. In order to determine the best solvent for the alkaloid equal weights of the powdered rhizome were macerated for 48 hours and percolated with alcohols of the three following strengths :—

(1) 10 fluid ounces alcohol 56 per cent. O. P.
(2) 8 „ „ „ + 2 fluid ounces water.
(3) 7 „ „ „ + 3 „ „

Thirty cubic centimetres of each percolate were evaporated to an extract over a water-bath, the extract was dissolved as far as possible in warm distilled water, and after the addition of ammonia was exhausted with chloroform. After separation the chloroform was agitated with very dilute hydrochloric acid and again separated. The acid solution was rendered alkaline with ammonia and the alkaloid extracted with chloroform. This, on evaporation, left crystalline residues which, when dried, weighed as follows :—

(1) ·054 grm. = ·18 per cent. of alkaloid.
(2) ·0595 grm. = ·20 „ „
(3) ·0475 grm. = ·16 „ „

From these results it appears that for Scopola, as for belladonna (*Pharm. Journ.*, [3], xvii., 843), the best solvent is not the official rectified spirit, but is prepared by adding 1 fluid part of distilled water to 4 fluid parts of alcohol 56 O. P. It is therefore proposed to employ a diluted spirit of this strength for the liquid preparations. It was found, however, that the increased amount of inert extractive which is obtained renders it inadvisable to employ this menstruum for the solid extract, and the official rectified spirit is therefore employed in this formula.

The following formulæ are suggested as providing standardized preparations, corresponding in alkaloidal value with the average strength of the present official preparations of belladonna :—

Extractum Scopolæ Alcoholicum.

Alcoholic Extract of Scopola.

Take of—

Scopola rhizome in No. 20 powder	1 pound.
Rectified spirit	48 fluid ounces.
Distilled water, Sugar of milk	Of each a sufficiency.

Mix the spirit with 12 fluid ounces of distilled

water. Macerate the Scopola in two pints of this mixture for forty-eight hours, agitating occasionally; then transfer to a percolator, and when the fluid ceases to pass, continue the percolation with the remainder of the diluted spirit. Afterwards subject the contents of the percolator to pressure, filter the product, mix the liquids, and evaporate over a water-bath to the consistence of a soft extract. Estimate the alkaloidal strength of this extract by the following method :—

Dissolve 2 grams of the extract in about 10 c.c. of warm distilled water, acidulated with a few drops of diluted hydrochloric acid. Pour the solution into a stoppered glass separator, and add ammonia until the liquid is distinctly alkaline. Agitate for a few minutes with 10 c.c. of chloroform, separate, and again wash the aqueous liquid with 3 c.c. of chloroform. Agitate the mixed chloroform solutions with 10 c.c. of diluted hydrochloric acid, separate, wash with 3 c.c. of the diluted acid, mix the acid solutions, render alkaline with ammonia, and agitate with 10 c.c. of chloroform. After separation wash the alkaline solution with 3 c.c. of chloroform, mix the chloroform solutions, evaporate in a dish of known weight, and dry the residue, which should be nearly colourless, at a temperature of 200° F. (93 C.). The weight of the residue thus obtained, multiplied by fifty, will give the percentage of alkaloid present in the extract.

Having thus ascertained the strength, warm the extract over a water-bath in a dish of known weight, and adjust by evaporation or by the addition of distilled water and sugar of milk in such proportion that the finished extract shall be of firm consistence and shall contain two per cent. of alkaloid.

It is also proposed to prepare a standard liquid extract of which 100 c.c. shall contain ·25 grm. of alkaloid. This will probably prove to be a useful preparation in itself, corresponding to the liquid extract of belladonna in the United States Pharmacopœia, but it is mainly intended to be employed for the preparation of the tincture and liniment, which can be immediately obtained from it by dilution with alcohol and addition of camphor.

Extractum Scopolæ Liquidum.

Liquid Extract of Scopola.

Take of—

Scopola rhizome in No. 20 powder	1 pound.
Rectified spirit, Distilled water	of each a sufficiency.

Mix 24 fluid ounces of the spirit with 6 fluid ounces of distilled water. Macerate the Scopola in this mixture for forty-eight hours, agitating occasionally. Transfer to a percolator, and when the fluid ceases to pass subject the marc to pressure, and filter the product. Mix the liquids and measure the exact volume of the mixture (a), after removing 25 c.c. for analysis. Evaporate the 25 c.c. over a water-bath to the consistence of a soft extract. Estimate the alkaloid present in this extract by the process given in the formula for the alcoholic extract. The weight of the residue thus obtained, multiplied by four, will give the parts by weight of the alkaloid in 100 fluid parts of the liquid (a).

Adjust the total volume of this liquid, either by evaporation over a water-bath, or by the addition of a mixture of four fluid parts of rectified spirit and one fluid part of distilled water, so that 100 c.c. of the liquid extract shall contain ·25 gram of alkaloid.

Emplastrum Scopolæ.

Plaster of Scopola.

Take of—

Alcoholic extract of Scopola	4 ounces.
Resin plaster, Soap plaster	of each 8 ounces.

Melt the plasters by the heat of a water-bath, then add the extract, and mix the whole thoroughly together.

This plaster contains nearly ·4 per cent. of alkaloid.

Linimentum Scopolæ.

Liniment of Scopola.

Take of—

Liquid extract of Scopola	24 fluid ounces.
Camphor	1 ounce.
Rectified spirit, Distilled water	of each a sufficiency.

Dissolve the camphor in the liquid extract, and dilute to 30 fluid ounces with a mixture of 4 fluid parts of rectified spirit and 1 fluid part of distilled water.

One hundred fluid grains of this liniment contain one-fifth grain of alkaloid.

Tinctura Scopolæ.

Tincture of Scopola.

Take of—

Liquid extract of Scopola	4 fluid ounces.
Proof spirit	21 „ „

Mix.

One hundred fluid grains of this tincture contain $\frac{1}{25}$ grain alkaloid.

Unguentum Scopolæ.

Ointment of Scopola.

Take of—

Alcohol extract of Scopola	1 ounce.
Benzoated lard	9 ounces.

Mix thoroughly.

This ointment contains ·2 per cent. of alkaloid.

OBSERVATIONS ON THE THERAPEUTIC ACTION OF SCOPOLA CARNIOLICA.*

BY SIR DYCE DUCKWORTH, M.D.

Physician to St. Bartholomew's Hospital.

Mr. President and Gentlemen,—A month ago Professor Dunstan kindly placed at my disposal a variety of preparations of Scopola for trial in my wards at St. Bartholomew's Hospital, and I agreed to employ them as occasion offered.

I must premise that I am not now much given to experimental therapeutics. This study had more interest for me some years ago than now. I am afraid that I am by nature of so conservative a disposition that I am rather given to exert my bedside art with the old and commonly approved remedies which have well served better physicians than I pretend to be. I am disposed, indeed, to to say with Bianca, "Old fashions please me best; I am not so nice to change true rules for new inventions."†

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* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, December 11.

† "Taming of the Shrew," act iii., scene 1.

I always feel myself under a heavy sense of responsibility in regard to hospital as well as to other patients, and I inculcate in my bedside teaching very strongly the duty of humanity in dealing with each case committed to our care. Our duties to the governors of the hospitals, no less than to society at large, compel a degree of caution in respect to the use of remedies which renders it positively difficult to take up new weapons in our treatment of patients ; for be it remembered, the modern physician does not treat *diseases* ; he treats *patients* suffering from diseases.

In truth, it was easier thirty years to try new remedies than it is now. In these days of publicity, with a large portion of the cheap press demoralized and hungry for gossip, it is necessary to be more than ever cautious in the conduct of the affairs of life. Personally, I have nothing but contempt for the vulgar intrusions I allude to, but I grieve to know that the worst result of idle criticism of this kind is a very positive injury to society in general, and to sick people in particular.

For me, the real tests of the value of drugs for the sick are to be applied at the bedside, and appraised there. This work necessarily follows on the primary researches instituted in the physiological laboratory. Both methods are now required if we are to work on a scientific basis. The clinical art of using drugs cannot of course be followed in a laboratory.

In trying remedies, it was formerly not uncommon to put a whole series of patients under the influence of some of them without special reference to their ailments. Such a system was little scientific, but, still, some results were readily and promptly obtained. Such a practice cannot be repeated in these days. We must now work more cautiously, and employ only such cases as appear likely to yield trustworthy results.

You may possibly think that a temper of mind such as this is little fitted to advance the art of therapeutics or to promote new research. I am not of that opinion. The moral for me is that in prosecuting new inquiries in the direction we are interested in to-night, we have simply to find out what is true, and not to work for mere results to cap our labours. The tendency for the young inquirer is to have results promptly brought out in concrete form, to produce something. This too often means hasty and incomplete observations which will not bear the test of time. Those who work longest and best in laboratories best know that a long and weary research, honestly carried out, with all care to avoid fallacies, often leads apparently to nothing, or something seemingly worse than nothing,—to wit a contradiction of the pet theory originally conceived. Is the research therefore useless? By no means. Good work is never lost, and remains fruitful for all time in every sphere of life. I learn, then, from all new investigations that patience and time are necessary factors in eliciting the truth, and that disregard of these commonly means failure all along the line.

Let me not be misunderstood in this too long preface. Though it is long since I did any experimental work myself, I wish to say that I am in full sympathy with experimenters, and I cordially wish success to the new Research Laboratory established here. I have no mawkish sympathy with anti-vivisectors, and fully recognize the value of experimental research properly carried out on the lower animals, a practice which the vulgar and unthinking public in this country, so full of strange inconsistencies, has unhappily almost banished from these kingdoms, to an extent at all events that we are a laughing-stock amongst the educated nations of Europe, and, as a consequence, our tale of scientific bricks is very small in practical physiology and pharmacology as compared with that produced on the continent. We have, therefore, to steal much of our knowledge of this kind, or to import it, and the same unthinking, and particularly pious, public is very pleased to avail of it at our hands if it will ease their pains and prolong their lives.

To come to my communication. In but a few weeks, I have had not many opportunities of trying Scopola. I have assumed as well-established that this drug has many of the properties of the atropaceous products, that it has anodyne and hypnotic powers, and will cause dilatation of the pupils.

For the observations I report, I have to thank my present senior house physician, Mr. Ogle, M.B., who has very carefully watched the effects of the different preparations submitted to me.

In the following case the extract of Scopola acted efficiently as an anhydrotic, and the extract locally applied acted excellently as an anodyne.

1. F. G., æt. 28. Suffering from pleurisy with some effusion. Sweated profusely at night. After ten days without treatment half a grain of Scopola was ordered to be taken at bedtime. For three days the patient sweated slightly in the early morning, then ceased to sweat at all morbidly, notwithstanding a rise of temperature which occurred on one evening ; whereas previously rises of temperature had been attended with very profuse sweating. The drug was stopped on the eighth day (December 1). Since then the patient has not noticed any sweating, nor has the drug caused any undue dryness of mouth or skin nor dilatation of pupils.

The same patient had a mass of enlarged and tender glands in his left groin, which made movement of that hip almost impossible, on account of pain. On November 24 liniment of Scopola was ordered warm, on lint. On November 15 there was no pain and little tenderness. On November 26 patient was able to move the hip-joint freely, without pain.

2. J. N., 17. Convalescent from rheumatic fever with infrequent pulse, and low tension. The average pulse-rate before the administration of the drug was fifty-seven to the minute ; he was taking 60 grains of salicylate of soda daily. On November 16 tincture of scopola was ordered in 10 minim doses thrice daily with the salicylate. The dose was increased to ℥xv. on the 19th and stopped on the 24th. During this period (November 16 to 24), the average pulse-rate was fifty-two per minute. The arterial tone improved. The pupils were no larger than before the drug was given ; the skin was acting normally, and the mouth was not dry. On November 24 the salicylate was reduced to gr. xx. daily with tinct. belladonnæ ℥xv. thrice daily. The average pulse-rate up to December 1 was fifty-two per minute with fair arterial tone. On November 30 the skin and mouth were rather dry, the pupils unchanged.

3. J. K., 25. Convalescence from rheumatic fever. The drug was given to quicken the pulse-rate, which was below 60 per minute. Tr. Scopolæ ℥xl. was administered daily for eleven days. The average pulse-rate during this period was sixty per minute with improved tension and volume. On the eleventh day tr. belladonnæ was ordered in place of tr. scopolæ, but as the patient left the hospital the second day after,

no comparison could be made. Unfortunately brandy ʒii. was ordered daily at the same time as the Scopola was commenced. No dryness of mouth or skin nor dilatation of the pupils resulted from the use of the drug.

4.—H. M., 38.—Rheumatic Fever.

The left wrist was extremely painful and swollen. The right wrist was slightly tender and swollen. At 7 p.m. on November 23 the left wrist was wrapped in lint and soaked in warm linimentum scopolæ. At 9 p.m. the left wrist was scarcely painful. The right wrist, however, was as painful and swollen as the left had been at 7 p.m.; it was therefore treated in the same way, but with belladonna liniment in place of scopola. At 9 p.m. also the first dose of sod. salicylate was given. The following morning there was little pain in the left wrist, and the right wrist was much easier than it had been. The patient said that the liniment on the left wrist had eased the pain better and quicker than that on the right.

5.—E. M., 18.—Chlorosis with palpitations.

November 25. Cardiac pain with palpitation. 26th emplastrum scopolæ ordered, with relief in a few hours.

In the next two cases I employed Scopola to quicken and steady the circulation after the manner induced by belladonna, using similar doses of the tincture. The result was seemingly satisfactory.

In neither case did the pupils dilate, and one unpleasant symptom met with sometimes in using belladonna, dryness of the mouth, did not occur.

In the second case great benefit accrued from the use of the liniment of Scopola (made as belladonna liniment) in a painful joint in the course of rheumatic fever, and in this case, too, the plaster was found available to mitigate cardiac pain and palpitation.

So far as these few observations go, I think it justifiable to affirm that in Scopola we have a drug which proves itself equally effectual with belladonna, and if it can be supplied at a cheaper rate than the latter drug, it can hardly fail to prove a boon to a large class of sufferers who can ill-afford to pay for efficient local employment of belladonna.

I could have wished to adduce many more facts before this meeting, but I am still investigating the properties of Scopola, and may perhaps have the honour of adding to this communication at some future time.

I am anxious to know if the extract proves as effectual for arrest of activity in the lacteal glands as does belladonna, also to try its properties in some varieties of heart-disease.

THE NATURAL HISTORY OF SCOPOLA CARNIOLICA, JACQ.*

BY E. M. HOLMES, F.L.S.

The synonymy of plants has, by the gradual increase of botanical knowledge during the last three centuries, become so intricate, that systematic botanists have at last found it necessary to adopt some rule for the selection of the proper name of plants which already possess several names. The rule that is now adopted is, to return to names given by Linnæus, or in cases in which his names are not applicable, to the first binomial name to which a good description is attached published after the date of Linnæus' 'Species Plantarum' (1753). It may here be pointed out that up to the time of Linnæus descriptive names were in common use instead of a generic and specific name, and that it is partly for this reason that the names given to plants previous to the time of Linnæus cannot be utilized. Some confusion exists, even at the present day, concerning the correct botanical name for this plant, due to the various changes in nomenclature which it has undergone at different periods and from various causes. Those who are familiar with the history of systematic botany are well aware how complicated the synonymy of plants is apt to become when the same generic name has been given by botanists to different plants at different dates.

The earliest mention of this plant by old botanical authors appears to have been made in 1563 by Mattioli ('Matthiolus, Comm.,' ed. I., p. 465), who employed for it the name of *Solanum somniferum alterum.* Caspar Bauhin, A.D. 1622 ('Pinax,' ed. I., p. 166) referred to it under the name of *Solanum somniferum bacciferum*, and J. Bauhin, A.D. 1651 ('Hist,' ed. III., p. 612) under that of *Solanum manicum*, "quod secundo loco proponuimus." In the year 1761, Dr. John Antony Scopoli, Professor of Botany at the University of Pavia, published his discovery of the plant in Idria, in his 'Fiora Carniolica' (ed. I., p. 288) under the descriptive name of *Atropa caule herbaceo, foliis ovatis, integris, fructu capsulari.*

In 1764, three years later than Scopoli's work, Jacquin, in his 'Observationes' (I., p. 32, t. 20), gave the plant the name of *Scopola carniolica* in honour of Dr. Scopoli. This, consequently, is the first binomial designation given to the plant; it is accompanied by an excellent description and illustration. Jacquin's name has unfortunately been several times altered by succeeding botanists, some of the names so given remaining in use even at the present day by horticulturists, whereby a good deal of confusion necessarily results. These changes of name demand a brief notice. Linnæus, in the year 1767 ('Mantissa, p. 46) altered the name of *Scopola carniolica* to *Hyoscyamus Scopolia*, probably because the capsule dehisces transversely in the same manner as in henbane.

In 1794, thirty years afterwards, Mœnch ('Methodus,' p. 462) referred it back to the genus *Scopola*, but altered the specific name to *trichotoma*, without assigning any reason for the change.

Schultes ('Oesterr. Flora.,' ii. 1794, p. 335, no. 846), observing that the name *Scopolia* had already been appropriated,* altered the name to *Scopolina atropoides.*

In 1821 Link ('Enum.,' I., p. 178) again altered the name to *Scopolia atropoides*, and lastly in 1837 G. Don ('Gen. Syst.,' iv., p. 470), gave it the name of *Scopolia carniolica*, and his name has been adopted by succeeding botanists, who have wrongly quoted Jacquin as their authority, for the latter repeatedly writes it "Scopola" in his published work.

His reason for this was probably that Adanson in the previous year had published the name Scopolia for a plant belonging to the natural order Cruciferæ,

* Read before the Pharmaceutical Society of Great Britain at an Evening Meeting in London, Wednesday, December 11.

* Da eine andere Pflanzengattung den nahmen Scopolia tragt, und da nahme dieses unsterblichen mannes nicht genug geehrt werden kann, so nannte ich sie Scopolina. Schultes, l.c.

Scopola carniolica, Jacquin. From Jacq. Obs. Bot., i., tab. 20.

and Jacquin apparently wished to honour the name of Dr. Scopoli in another form, for he appears to have been highly esteemed by his contemporaries. Subsequently to Jacquin's publication of the name Scopola the generic name Scopolia was applied to plants of three other natural orders. The synonymy of the generic name Scopolia may therefore be represented as follows :—

A.D.			
1763	Adanson, for what is now	*Ricotia L.*,	*Cruciferæ.*
1776	Forster	„	„ *Grisclinia Forst.*, *Cornaceæ*
1781	Linnæus	„	„ *Daphne L.*, *Thymelaccæ.*
1790	Smith	„	„ *Toddalia Juss.*, *Rutaceæ.*

And that of the name of the plant as follows :—

A.D.	
1563	*Solanum somniferum alterum* .....Mattioli.
1622	*Solanum somniferum bacciferum*.....C. Bauhin.
1651	*Solanum manicum, etc.* .....J. Bauhin.
1761	*Atropa caule herbaceo, etc.* ..... Scopoli.
1764	*Scopola carniolica* .....Jacquin.
1767	*Hyoscyamus Scopolia* ....Linnæus.
1794	*Scopola trichotoma*..... ....Mœnch.
1794	*Scopolina atropoides*.....Schultes.
1821	*Scopolia atropoides* ....Link.
1837	*Scopolia carniolica* ....G. Don.

The name given to the plant by Linnæus, *Hyoscyamus Scopolia*, is not applicable, inasmuch as botanists of the present day consider that the plant possesses sufficient distinctive characters for it to be placed in a separate genus ; and as Jacquin's name for the plant is the first binomial one published after the date of the first edition of Linnæus'

'Species Plantarum,'* it must for this reason supersede the later names given to the plant by Mœnch, Schultes, Link and G. Don.

The description of the plant given by Jacquin is as follows :—

Scopola carniolica Jacq.('Obs.,' 1764, tab 20, p.32–33.)

Scopola. — Atropa caule herbaceo, foliis ovatis integris, calycibus erectis, fructu capsulari. *Scop. carn.*, p. 288.

A Joanne Antonio Scopoli, Idriensi medico, et historicæ naturalis indefesso cultore, omnium, ni fallor primo hæc planta sponte nascens in sylvis umbrosis Idriensibus reperta fuit et descripta; quæ cum omnino mihi videdatur novum genus postulare, ab ipso inventore desumpto nomine Scopola appellata mihi est. Ex radice transmissa jam quartum annum in horto Vindobonensi perennat et flores produxit. Habitu admodum ad Atropam Belladonna accedit, a qua in fructus structura discriminatur quam maxime. Radix nodosa crassa et inæqualis est. Caulis herbaceus annuus, erectus, pedalis, glaber et subtrichotomus, sulco a foliis decurrente insignatur. Folia sunt obovata, vel lanceolata, integra, vel infima in cultis sæpe antice sinuato-dentata, venosa, rugosa, in petiolum decurrentia, inferiora opposita, reliqua sparsa nec ordinem servantia. Flos ex pedunculo solitario longiori pendulus inodorus, corolla ex purpureo flavescente, charactere gaudet sequenti.

Cal.—Perianthium monophyllum, hemisphæricum, quinque-dentatum, persistens.

Cor.—Petalum campanulatum, oblongum, magnum, quinque-dentatum, basi in tubum brevem angustatum, deciduum.

Stam.—Filamenta quinque, subulata, inæqualia. erecta, hirsuta, petalo breviora. Antheræ oblongæ, incumbentes, magnæ.

Pist.—Germen ovatum, obtusum, receptaculo insidens, in ambitu ad basin denticulis quinis nectariferis notatum. Stylus filiformis, staminibus longior. Stigma capitatum, obtusum.

Per.—Capsula subrotunda, calyce inflato excepta, bilocularis, una cum pedunculo et calyce decidens, post lapsum tandem transversim dehiscens. Semina reniformia, verrucosa nitida in quolibet loculamento circiter viginto tria affixa receptaculo orbiculari.

Sem.—Reniformia, verrucosa, nitida, in quolibet loculamento circiter virginto tria, affixa receptaculo orbicularo.

The geographical distribution of *Scopola carniolica* appears to be limited to S. W. Germany (Bavaria), Austro-Hungary (Styria, Carinthia, Carniola, Croatia, Banat, Transylvania), and S. W. Russia (Podolia and Volhynia). It grows in damp, stony places amongst bushes in beechwoods on calcareous soil, chiefly in hilly or mountainous districts.

In appearance it closely resembles belladonna in shape of leaf, shape, colour and position of flower, in the branching of the stem and in the floral leaves being frequently geminate. But it differs in its short stature (about 1 foot high) in the more reticulated thinner leaves, the capsular, transversely dehiscing fruit, and in the presence of a rhizome.

About eighteen months since I sowed some seeds of *Scopola carniolica* in my garden. The seeds came up readily, but made very slow progress during the summer, showing but few leaves. Thinking that perhaps the soil did not suit them, although planted on a chalky slope, I pulled up several of the plants and found that they had been forming rhizome instead of leaves. The flowers appear in March or April, according to the mildness of the season.

Two varieties of the plant were described by Koch ('Syn.,' ii, p. 585), the one having tubular, bell-shaped flowers of a brownish purple colour, and the other growing at a higher elevation, and having an obovate campanulate corolla of a green colour. The purple-flowered plant is the commoner form, the green-flowered variety being apparently recorded only from the neighbourhood of Schelimlje, near Auersberg, and Gerlachstein and Grimberg, near Laibach, in Carniola. This green-flowered variety was described as a species by Koch (l.c.) under the name of *Scopolina Hladnikiana*, this name having been given to Koch in a letter received by him from Freyer, who called his attention to the plant. But Freyer appears to have distributed the plant also under the name of *Scopolina viridiflora*, under which name Rabenhorst issued the plant in his 'Flor. Eur. Exsicc,' No. 2056.

It is apparently this variety, the rhizome of which, grown in the botanical garden at Marburg, has been examined by Professor Schmidt under the name of *Scopolina Hladnikiana*. A third variety, having yellow, conical campanulate flowers is mentioned by Decandolle ('Prodromus,' vol. xiii., ii., p. 556), under the varietal name, β, concolor.

As characterized in Bentham and Hooker's 'Genera Plantarum,' the genus *Scopolia* (or more correctly *Scopola*) differs from *Hyoscyamus*, which it resembles in the mode of dehiscence of the capsular fruit, in its solitary axillary flowers and inflated calyx, and in the entire leaves.

From *Atropa*, which it resembles remarkably in leaves and flowers, it differs in the fruit not being baccate, in the inflated calyx and the rhizome. It thus forms a link between the genera *Hyoscyamus* and *Atropa*. In the tissue of the rhizome it more nearly approaches the latter genus in having the peculiar sandy raphides present in both root and leaves of belladonna, but not in henbane.

Bentham and Hooker refer two other plants to the genus "Scopolia," viz., *Scopola japonica* and *S. lurida*.

The second species of Scopola was collected in Japan by Tschonoski, and was described by the celebrated Russian botanist, Professor Maximowicz, in the following terms :—

Scopolia Japonica (sect. Scopolia, Dun.) glabra, rhizoma horizontali nodoso crasso in radicem fusiformem longissimum desinente; caule tereti sulcato dichotomo basi squamis spathulatis membranaceis obsesso ; foliis in petiolum longiusculum alato-decurrentibus, sparsis, ellipticis vel oblongis acuminatis, antice sæpe plus minus profunde dentatis, vel repando-dentatis; floribus axillaribus nutantibus solitariis ; calycis dentibus inæqualibus acuminatis ; corolla subobsolete 5-dentata, filamentis ad insertionem villosis ; stylo declinato apice incurvo, fructu. . . . . Atropa Belladonna Japonensum ideoque etiam, 'Miq. Prol.,' 281. 'Ha shirido uro' Ykuma-yu-soai. 'Soo bokf,' etc., iii., fol. 18. In altissima alpe Nikkoo, ad rivulos florentem legit Tschonoski (Maximowicz, 'Melanges Biologiques,' xii., p. 629).

To this description the following observations are appended :—

* The *Systema naturalis Plantarum* and the *Genera Plantarum* were published respectively in 1734 and 1737, but these do not contain specific names. The *Species Plantarum* was published in 1753.

Simillima *Scopoliæ carniolicæ*, Jacq., sed ob stylum curvatum neque rectum, calycis dentes, interdum valde, inæquales, et fructum hucusque ignotum, distinguenda videtur. Præterea folia constanter longius petiolata (in spec. 30 collectis) petiolis ½ vel ⅓ partem laminæ, rarius in superioribus, ¼ partem laminæ longus, in *Sc. carniolica* ad summum, ¼ partem nuncupans. In *Sc. carniolica* insuper folia sæpissime obovata et obtusiuscula atque rarius repanda. Corolla in sicco fusca, violacea, igitur videtur in vivo fere ut in planta europæa. Statura atque magnitudine partium planta nostra individua robusta stirpis europæa œmulatur.

From these observations it is evident that the difference (already recognized by Bentham, 'Gen. Pl.,' II., p. 902) between the two species is very slight, consisting, in the case of *S. japonica*, in the style being curved, the teeth of the calyx unequal, and the leaves less obovate and having petioles usually nearly twice as long as those of *S. carniolica*. The fruit of *S. japonica* does not appear to have been seen.

A specimen of the plant exists in the Kew Herbarium, collected in the above locality by Tschonoski in 1864, and another small specimen, apparently the same species, collected on the Soul mountains in Corea by Mr. W. R. Carles in 1885.

It is this species which yields the Japanese Belladonna root, offered in the London market a few years ago. See *Pharm. Journ.*, [3], p. 789.

In reply to my request for the loan of a specimen of the plant to illustrate this paper, Professor Maximowicz has most generously presented to the Museum of the Society the only duplicate specimen in his possession having the rhizome attached to it.

The similarity between this plant and *S. carniolica* is very great, and on inquiring of Professor Maximowicz if he considered it, in the light of present knowledge, to be a good species, he candidly states, "As to the value of *S. japonica* as a species I cannot but have my strong doubts about it. There are hardly any differences, and I am sure, were it found in Europe, one would not have thought it different."

The third and only remaining species placed in this genus by Bentham and Hooker is "*Scopolia*" *lurida*, Dun., a native of the Himalaya Mountains. It differs from the two plants already described in its hairy, toothed leaves, strongly ribbed, reticulated and inflated calyx, and broader evidently lobed corolla.

Its habit of growth is said to be exactly that of the *Scopola* genus, but the plant has a very large, somewhat fleshy fusiform root, quite different from the comparatively small rhizome of *S. carniolica* and *S. japonica*. Specimens of the plant exist in the Kew Herbarium, from Nepaul, Sikkim and Kumaon.

At different times this plant has been referred to five different genera, under the names respectively of *Anisodus luridus*, Link and Otto; *Nicandra anomala*, Link and Otto; *Physalis stramonifolia*, Wall.; *Whitleya stramonifolia*, Sweet; *Anisodus stramonifolius*, G. Don. The large root of this plant has never to my knowledge been sent to this country as a drug, but seems worthy of chemical investigation, since it is stated by the late Dr. E. J. Waring to be as powerful as belladonna, if not more so.

I find in a fresh root of the plant (kindly sent to me from the Botanical Garden at Edinburgh by Mr. Lindsay) the peculiar raphides common to the two other members of the genus, but less equally distributed, being abundant in the cortical portion of the root, whilst very few occur in the centre, yet I venture to doubt whether it is rightly placed in the genus *Scopola*. In the hairy apparently toothed leaves, more open flowers, and very inflated and strongly reticulated calyx, it recalls *Physalis* rather than *Scopola*.

I gladly take this opportunity of expressing my deep obligation to Professor Maximowicz; also to Professor Goebel, of Marburg, for fresh specimens of the root of *Scopola carniolica*, var. *Hladikiana*, which I have now under cultivation; to Mr. R. Lindsay, for similar specimens of *S. lurida*; to Mr. J. Hart, F.C.S., of Manchester, for kindly cutting the sections which I am thus enabled to place on the table to-night; and to Mr. B. D. Jackson, F.L.S., for kindly taking the trouble to examine and confirm the synonymy I have adopted.

HISTOLOGICAL CHARACTERS OF THE RHIZOME OF SCOPOLA CARNIOLICA COMPARED WITH THOSE OF THE ROOT OF ATROPA BELLADONNA.*

BY THOMAS GREENISH.

At the request of Professor Dunstan, histological examinations of the root of belladonna and the rhizome of *Scopola carniolica* were undertaken, with the view to determine if any, and what structural differences may exist between them.

Sections were made of each root. Immediately under the epidermis of the belladonna root there is a layer of cortical cells forming a dark line. On isolating the individual cells it is found that this cortical layer consists of from six to eight tabular cells deeply coloured. Next below on the drawing (fig. 1),

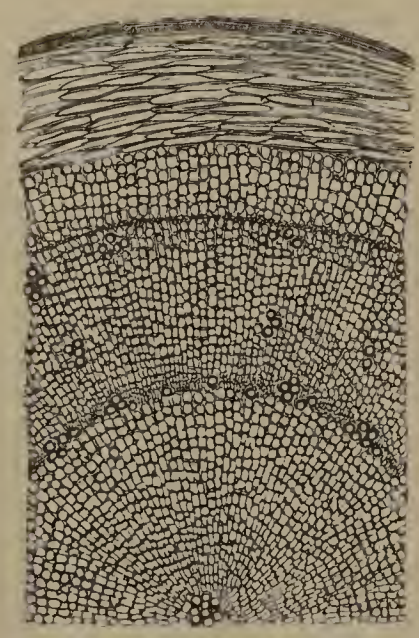

Fig. 1. Section of Belladonna Root.

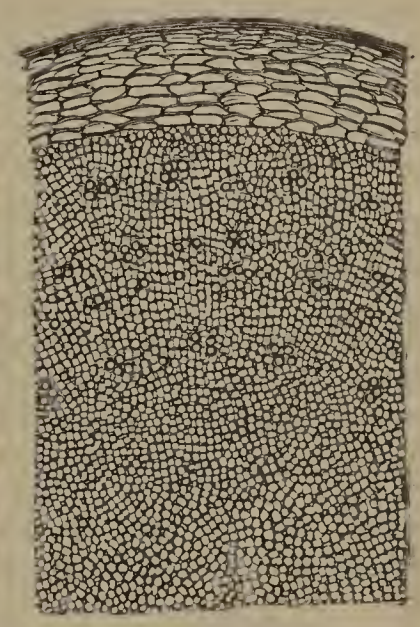

Fig. 2. Section of Scopola Rhizome.

but inward in the root, are several layers of thin cells, pressed or stretched in a tangential direction, long and narrow; and further down again several layers of cells not so long and wide, being subjected to less pressure they tend more towards the shape of the cell in its normal condition. These together constitute the bark.

* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, December 11.

Within the bark there is a faint thin line, the cambium layer externally surrounding the vascular bundles, which are themselves imbedded in the cellular or fundamental tissue, and in somewhat definite lines. The cells of the bark within that dark line are of a faintly brown colour, and the same remark applies to the cells composing the fundamental tissue, but there is an entire absence of schlerenchymatous cells.

All the parenchymatous cells of the bark and from the bark inwards are more or less filled with starch grains, but these were removed to make the structure more visible. Most of them *in situ* are compound grains, being composed of two or more adhering together. The typical form is the muller-shaped grain. When the combination is a doublet they adhere by their truncated bases, and when a triplet they are muller-shaped with dihedral bases. A dark spot will be seen here and there in the fundamental tissue; these are cells of raphides cut in a transverse direction. Examining these raphides by a micro-chemical process, the application of acetic acid slowly permeating the tissue under the slide, there was no effervescence, and it was concluded that the raphides are not composed of a carbonate; most probably they are oxalates. Longitudinal sections of each were made, but they exhibited nothing special beyond the cells above referred to, in their length showing a long cell or sac filled with raphides.

Passing now to a description of the *Scopola carniolica*, the dark line under the epidermis (fig. 2) is narrower and less coloured than that of belladonna. The entire bark is not so thick; also, the vascular bundles are neither so large no so numerous, and the bundles of raphides are less bold than in the belladonna root. In fact much the same tissues are present, but less pronounced than in belladonna. The starch grains also are smaller, the typical grains being, as in belladonna, muller-shaped, but there is a large number which it is difficult to assign to any well-defined type of starch grains.

A root of *Scopola japonica* was also submitted for examination, but it was so very dark in colour and so friable that in endeavouring to get a sufficiently thin section great difficulties presented themselves. It seemed to have been at some time or other high dried, subjected to considerable heat without actually charring it. However sections were at last obtained, and the result showed the root to be identical in its general features with that of *Scopola carniolica*. To determine the probability of the colour and friable character of Japanese scopola being due to a high temperature, a piece of the *Scopola carniolica* in its normal condition was placed in a tolerably hot oven; after a time it assumed the colour of the Japanese drug, and with a high colour it was equally friable.

Very minute details, when they did not serve to elucidate any point in this investigation, have been avoided.

On the whole it will be evident from this histological interpretation that there seems a close alliance in anatomical structure between the rhizome of *Scopola carniolica* and the root of *Atropa Belladonna*.

[*The discussion on this and the preceding papers will be found on page* 477.]

ON THE ROOT BARK OF EUONYMUS (WAHOO) AND ON EUONYMIN.*

BY W. A. H. NAYLOR, F.I.C., F.C.S., AND E. M. CHAPLIN, F.C.S.

At the meeting of the British Pharmaceutical Conference held at Newcastle in September last we read a paper entitled "Chemical Observations on the Root Bark of Euonymus."† In accordance with an intimation we then made we have now the pleasure of describing further experiments respecting the chemical and pharmaceutical properties of the bark, which we have since instituted.

In the paper referred to we drew attention to a body which for the time being we named "atropurpurin," and described it as a white crystalline body possessed of glucosidal properties and having a fixed melting point of 182° C. The sample exhibited at the Conference was afterwards exposed for a considerable time on bibulous paper, with the result that it became somewhat discoloured, particularly at the edges, thus indicating that it still contained a certain amount of impurity. We consequently deemed it advisable to prepare a much larger quantity of the substance, which was purified by precipitating it from its strong aqueous solution by means of alcohol, the process being repeated several times. After treatment in this manner it was exposed for one month on blotting paper and at the end of that time was found to have remained perfectly white and permanent. This sample when examined was found to agree with that obtained previously with the one exception, that after being boiled for three hours with a 2 per cent. aqueous solution of sulphuric acid it failed to reduce Fehling's solution.

Portions were burnt with fused chromate of lead, and the following figures represent the mean of two experiments, expressed as percentage composition :—

C.	39·12
H.	7·81
O.	53·07

We consider that these results, when taken in conjuction with the characters already enumerated, and also the fact that the solution is optically inactive, afford ample proof that the body is either identical with or an isomer of dulcite. We are therefore glad to be able to substantiate the inferences drawn by Mr. Hooper in a letter which he communicated to the editor of the *Pharmaceutical Journal* of last Saturday's issue (Dec. 7).

Through the courtesy of Professor Dragendorff, of the Dorpat University, we have had the opportunity of perusing the dissertation of G. Romm upon euonymin, an extract of which we quoted in our last paper. Since reading it we find that the product we obtained by following the method which he adopted for the separation of his "euonymin" is similar in its characters to that substance as described by him, and also agrees with it in its reactions. Taking into consideration the properties of this body, amongst others its solubilities and the fact that it is precipitated by tannic acid, we are inclined to believe that it is essentially Wenzell's

* Read before the Pharmaceutical Society of Great Britain, at an Evening Meeting in London, Wednesday, December 11.

† *Pharm. Journ.*, [3], vol. xx., p. 273.

euonymin which Romm has succeeded in obtaining as a definite principle.

It is interesting to note the common occurrence of dulcite in the different species of euonymus bark that have been chemically examined. Mr. Hooper states in his letter that he has proved its presence in two Indian varieties of the bark, *Euonymus pendulus* and *E. crenulatus*. Kubel also (*Journ. de Pharm. et Chemie*, 1862, p. 523) found in the bark of *Euonymus Europæus* a principle which he termed "euonymite," possessed, he states, of properties identical with those of mannite, with the exception of its mode of crystallization and melting point (182° C). We also note in Romm's dissertation that in a preparation of euonymin made by Schuchardt, Herr Merck found dulcite along with other substances.

We have recently examined a few specimens of *euonymin*, and they are interesting as showing the kind of proximate principles upon which manufacturers rely for producing the reputed effects of the drug. To the best of our knowledge these specimens may be regarded as fairly representative of the different makes supplied by wholesale druggists.

	(1).	(2).	(3).	(4).	(5).
Moisture per cent .	4·10	4·70	4·90	8·10	This sample was entirely soluble in cold water and consisted of the aqueous extract of the bark diluted with powdered liquorice.
Organic matter p.c. .	59·52	72·70	71·46	78·85	
Ash soluble in water p.c.	2·21	12·50	2·72	6·20	
Ash insoluble in water p.c.	34·17	10·10	20·92	6·85	
Silica, p c.	7·12	3·20	3·43	1·57	
Portion extracted with—					
(1) Cold water p.c.	25·20	55·60	14·18	56·26	
The marc then treated with—					
(2) Proof spirit p.c.	10·58	2·48	12·25	2·60	
and finally with—					
(3) Recti. spirit p.c.	8·49	3·58	14·74	1·03	

No. 1. The insoluble matter consisted mainly of carbonate of barium. The proof spirit extract was chiefly composed of yellow resin and was slightly bitter to the taste. The rectified spirit residue consisted of fair proportions of brown resin and free fatty acids and was markedly acrid. Both extracts were of a green colour.

No. 2. The insoluble matter was chiefly alumina. The product obtained by treatment with proof spirit consisted chiefly of yellow resin and was distinctly bitter. That obtained by rectified spirit coloured bright green, was oily and markedly acrid and contained a small proportion of brown resin.

No. 3. The insoluble matter was mainly composed of carbonate of barium, together with salts of lime. The proof spirit extract was of a dull green colour, friable and faintly bitter and contained yellow resin. Rectified spirit yielded a bright green oily extract free from acridity and containing a good proportion of brown resin.

No. 4. The insoluble portion consisted of salts of iron, alumina and lime. The proof spirit extract was composed chiefly of yellow resin, which was coloured bright green, having an extremely bitter taste. The rectified spirit extract contained free fatty acids and was devoid of bitterness, but faintly acrid.

It may perhaps be well to point out that, in the above experiments, we do not pretend that the proof and rectified spirits used were capable of sharply separating the different principles. Of the diluents used in the preparation of the euonymins we may remark that, in our judgment, manufacturers should refrain from the use of carbonate of barium until assured that it is positively inert. The difficulty of obtaining an oily extract in the form of a permanent powder has most probably led to its selection. From a perusal of the above results, the fact which impressed itself most upon us, was the lack of uniformity exhibited between the different makes in respect of the relative proportions extracted by proof and rectified spirits, the respective preparations having been previously exhausted with water. The explanation is without doubt to be found in the circumstance that alcohol of different strengths has been used in effecting the extraction of the principles from the bark. Another point which arrested our attention was the relatively large and varied percentage of matter dissolved out by water.

Does water, cold or hot, withdraw from Wahoo bark those principles upon which its reputation as a hepatic stimulant is founded? This question is one of considerable importance, and we have not shrunk from an endeavour to contribute to its solution. For this purpose a quarter of a pound of the root bark of Wahoo in coarse powder was percolated with hot water until exhausted; the percolate was evaporated to 18 fluid ounces, and the volume made up to one pint with rectified spirit. Of this infusion one of us took one teaspoonful (equivalent to 11 grains of the bark) three times a day for ten days. Failing to recognize at the end of this period any effect traceable to the remedy, the dose was increased by one-half, and the morning one always taken before breakfast. Again no noticeable effects were produced. We then ventured to enlist the services of a few of our friends, most of whom were pharmacists. Teaspoonful doses were taken by them regularly for a week at least. In each case they reported no recognizable effect, save that they credited it with increasing the appetite.

Our next venture was to put to the test of personal experience alcoholic extracts of wahoo bark. These were obtained by extracting the root-bark, previously exhausted with water, with alcohol of 65 and 84 per cent. by weight. Of these portions, the extract from the weaker alcohol was taken in doses of two grains twice a day. It acted as an unmistakable laxative and on the third day there was evidence of an action on the liver. The 84 per cent. portion in similar doses differed only in that it acted as a more decided laxative. We feel bound to infer that while the aqueous extract of this drug may or may not possess valuable medicinal properties, its power to act as an intestinal or hepatic stimulant resides somewhere in the resinous and free fatty acid principles, which require for their removal alcohol of a strength not much below 65 per cent.

Proceeding upon these lines we have prepared a liquid extract of the drug, which we recommend for adoption by pharmacists.

Extractum Euonymi Liquidum.

Liquid Extract of Euonymus.

Take of—

Euonymus bark in No. 20 powder 20 ounces.
Rectified spirit }
Distilled water } . Of each a sufficient quantity.

Moisten the powder with 8 fluid ounces of a mixture of four volumes of rectified spirit and one

volume of distilled water. Pack tightly in a percolator, and pour on sufficient menstruum to saturate the powder and leave a stratum above it. When the liquid begins to drop close the lower orifice and macerate for forty-eight hours; then allow percolation to proceed, gradually adding menstruum until the euonymus is exhausted. Reserve the first 17 fluid ounces of the percolate, and evaporate the remainder to a soft extract; dissolve this in the reserved portion, and add enough menstruum to make the liquid extract measure 1 pint.

Dose: 15 to 60 minims.

We are also of opinion that in the preparation of *euonymin* a weaker alcohol than 65 per cent. should not be used, and that the drug should be exhausted with water and dried prior to its percolation with this menstruum. The final product obtained after distillation of the spirit and desiccation of the residue, when mixed with an equal weight of sugar of milk, will be found to contain sufficient of the brown resin to powder with ease. The dose is from ½ to 2 grains.

As a tincture the process of the B.P.C. Unofficial Formulary yields an effective preparation; but, so far as our personal experience goes, the product is not more active than one which has been prepared with rectified spirit and water in the proportion of 4 to 1 by volume.

To any who may object that our statements are based upon inferences drawn from the use of methods unscientific, and too restricted in their scope, we simply ask that they will take the earliest favourable opportunity of testing our conclusions by the self-administration in suitable doses of the preparations we recommend.

[*The discussion on this paper is printed on p.* 478]

NOTES ON CALAMINE.*

BY W. MURTON HOLMES.

Although calamine cannot be said to be in very general demand, it is extensively prescribed by specialists in skin diseases, who seem to prefer it to the pure carbonate of zinc.

Whether or not its action is anything more than a mechanical one is hardly a subject for us to discuss. Our province is to endeavour to supply the demands of the medical profession.

With the object of furnishing a standard for the guidance of pharmacists, it has been re-introduced into the Pharmacopœia; but there are few substances which pass through the hands of a dispenser which exhibit greater variation.

This is very much to be regretted, and I venture to think that for the credit of pharmacy generally, there should be greater uniformity, as nothing tends more to create an unfavourable impression than different results being obtained from the same prescription when dispensed at different establishments, or even sometimes at the same.

Though well aware that several dispensing firms make a speciality of prepared calamine (no two samples of which have the same appearance), I have not found it possible to procure any in the ordinary way of business that would agree with the characters and tests of the Pharmacopœia, and it occurred to me that it might be a useful undertaking to examine samples obtained from various sources.

Before entering into detail I propose to make a few general remarks on calamine.

Calamine, or native carbonate of zinc, is found both in carboniferous limestone, and in dolomitic conglomerate, either embedded with the strata, or occupying depressions in them, and is one of the more important ores of zinc. It occurs in rhombohedral crystals, in nodules of concentric layers, in botryoidal and earthy masses, and as stalactites and stalagmites.

Its colour is equally variable, depending upon the nature of the other minerals associated with it. White, yellow, green, blue, pink, purple, and various shades of red, are all found. Its specific gravity is from 4·30 to 4·45.

Calamine is often intimately associated with heavy spar (barium sulphate); prismatic or electric calamine (zinc silicate); blende (zinc sulphide) and galena (lead sulphide). It receives its name from the reed-like appearance it presents after fusion.

The principal sources of calamine are: La Vielle Montagne, situated upon parts of the Belgian and German territories between Aix-la-Chapelle and Verviers, where the mines have been worked since 1435; Sardinia, Spain, Greece and Silesia.

"The Cantabrian coast of Spain is very rich in calamine, especially at Santander. It occurs with galena in dolomitic limestone of Jurassic age, partly in the form of veins, and partly in very irregular deposits. The ores are often found imbedded in clay, and the centre of large masses is sometimes formed of dolomite, thus indicating their origin. At greater depths crystallized blende is found in concretionary masses, covered by concentric layers of heavy spar, and near the surface it is partly converted into zinc carbonate" ('Memoirs Geological Survey,' 1876).

Messrs. Sullivan and O'Reilly ('Notes on the Geology and Mineralogy of the Spanish Provinces of Santander and Madrid,' 1863) suggest that the zinc carbonate was originally precipitated from solution either by calcium carbonate or dolomite, in some instances the replacement being so complete that calamine passes insensibly into dolomite. Both calcium and magnesium carbonates appear to have taken part in the decomposition, but the magnesium carbonate being more soluble has been removed, while some of the calcium carbonate still remains, filling joints, or forming a kind of conglomerate.

De la Beche ('Memoirs of Geological Survey,' 1876) thinks it extremely probable that calamine is derived from blende, sulphur having disappeared and being replaced by carbonic acid, the conditions under which it is found, especially in limestone districts, supporting this view.

The mines of Laurium, in Greece, which were worked 600 B.C., yield a large quantity of calamine. They contain a bed of it averaging 11½ feet thick. The ore is very rich, and is generally calcined before exportation. After calcination it averages 60 per cent. of zinc. Production in 1881—Roasted calamine, 36,665 *tonnes*; raw calamine, 101 *tonnes*.

* Read before the Pharmaceutical Society of Great Britain at an Evening Meeting in London, Wednesday December 11.

In Sardinia, calamine is found in large quantities in Silurian limestones containing masses of galena. The calamine of Lombardy is an almost pure carbonate of zinc, and was formerly used in the manufacture of brass (*Pharm. Journ.*, vol. xii., p. 460).

In this country it is found in Cumberland, Derbyshire and Somersetshire, also in Scotland and Ireland, but the production of zinc has been decreasing for some years. In 1859 the total quantity of zinc extracted from English mines was 11,556 tons ; in 1872, 5191 tons.

It is impossible to state how much of this was from calamine, all the zinc ores in mineral statistics being arranged under one heading, but the quantity must have been very inconsiderable, as blende is the principal ore. Calamine was formerly so abundant in the Mendip Hills as to be used for ballast. Considerable quantities of foreign ores are brought to this country to be smelted.

The value of imports of zinc in 1886 was £1,163,665.

The Pharmacopœia description of prepared calamine is, "A native carbonate of zinc, calcined in a covered earthen crucible at a moderate temperature, powdered and freed from gritty particles by elutriation."

"A pale pinkish-brown powder without grittiness, almost entirely soluble, with effervescence, in acids."

Seven samples of prepared calamine were examined as to their solubility.

A. Prepared from a selected piece of ore. Left 6 per cent. residue after boiling in strong hydrochloric acid.

B. Obtained from a wholesale drug house. A heavy soft powder, free from grit. Said to be genuine, but artificially coloured. No effervescence on boiling with hydrochloric acid. Left 84 per cent. residue.

C. From a retail pharmacy. Pale brick-coloured, not very smooth, and rather dirty. Effervesced briskly, and left 64 per cent. undissolved.

D. From a retail pharmacy. Pale salmon colour. Effervesced briskly, and left 66 per cent. residue.

E. From same source as the last sample. Paler in colour, brisk effervescence on boiling with acid. 70 per cent. residue.

F. From wholesale drug house. Specific gravity, 3·8. Effervesced briskly, 60 per cent. undissolved. Suspecting the presence of prepared chalk, I carefully washed some and examined it microscopically. The presence of foraminifera confirmed my suspicions.

G. From a retail pharmacy. Very slight effervescence on boiling with acid. 76 per cent. residue.

The insoluble matter in a few cases was examined and found to contain barium sulphate and silica.

In March, 1887, a paper appeared in the *Pharmaceutical Journal*, by Mr. Bennet, on "The Calamine of Commerce," in which the results of the analyses of four samples were given. These showed that two of them contained a fair proportion of zinc, one four per cent. only, whilst in one zinc was conspicuous by its absence.

As the prepared calamine was so unsatisfactory I turned my attention to the ore itself, and procured some from Derby, a sample of which is exhibited. Unroasted ore, specific gravity 3·8, left 40 per cent. residue after boiling with hydrochloric acid.

Roasted ore, specific gravity 4·0. Effervescence brisk and long continued on boiling with hydrochloric acid. Residue 30 per cent., chiefly barium sulphate.

I am very much indebted to Mr. Grose, of Swansea, for the great trouble he has taken in procuring me a number of samples of calamine sent to that port for the purpose of being smelted, and which are now exhibited.

Up to the present time I have been unable to procure any of Belgian or Spanish origin. The La Vielle Montagne Company has two or three agents in London, neither of whom was able to supply me with the raw material.

1. Italian calamine. Roasted before importation. Beautiful pink colour. No effervescence on boiling with hydrochloric acid. Residue 20 per cent.

2. Italian calamine. Roasted before importation. Effervesced slightly on treating with acid and left 60 per cent. residue.

3. Calamine from Laurium. Unroasted. Said to be the finest imported and to contain 63 per cent of zinc, but too dark in colour for use in pharmacy.

Several other samples were sent, but either their origin was unknown or the colour unsuitable.

In calamine we have to do with a very variable substance—one that varies considerably in the same vein of ore, and it would be possible to produce a prepared calamine answering all the Pharmacopœia tests with but a small percentage of zinc in its composition, and containing instead calcium or magnesium.

In my opinion in the next edition of the Pharmacopœia the source of the calamine should be stated—a source whence not only a few isolated good pieces of ore can be selected, but one where the whole is of tolerably uniform quality, and the supply abundant.

Then again the percentage of zinc should be stated, and there should be something more definite with regard to colour than the description "a pale pinkish brown." Perhaps a slip of paper of the required tint of the calamine *when moist* could be inserted.* Better still would it be if something of a definite nature could be substituted. Possibly the white variety, which is also the purest, with a definite quantity of colouring matter, would answer the purpose.

There is no difficulty in levigating the ore when it can be obtained. My plan is to roast it gently on a gas stove for about a quarter of an hour. This makes it darker in colour and at the same time more friable, so that it is easily powdered. I then wash with plenty of water, pass the liquid through lawn, and allow the suspended matter to subside. The supernatant liquid is then poured off, the pasty mass allowed to drain on calico, then pressed and dried. It is finally passed through a sieve to break up any lumps.

[*The discussion on this paper is printed on p.* 478.]

* I say "when moist" because the colour is then more decided.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 14, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

DEATH BY POISON.

THE publication of the Annual Report of the Registrar General furnishes opportunity for again taking a retrospective review of the extent to which death by poison continues to occur. According to the data contained in that report relating to the year 1888 the total number of deaths by poison in England and Wales was 710. In the Registrar's report these deaths are classed among those resulting from some form or other of violence, the total number of which was 17,534. It will be seen therefore that although the deaths from poison are slightly more numerous than in the previous year they constitute only a very small proportion of the classes under that head, and that altogether there is, relatively to other causes of violent death, but little reason to entertain much apprehension on this score from poison. It is reasonable to infer that the restrictions imposed upon the sale of poisons have been influential in bringing about such a state of matters, and that in this respect the Pharmacy Act of 1868 has really been very beneficial in the interest of public safety. Of the total number of 710 deaths by poison that are recorded as having occurred in the year 1888, some were cases in which poison was used with homicidal or suicidal intention, no less than 333 of them having been of that character. It may be useful to compare this number with the total number of deaths ascribed to homicide and suicide, which is 2609, those due to poison amounting to 12·38 per cent. of the whole. Here, again, it will be seen, that poison has been comparatively a danger that is much less to be feared than others, although the deaths from suicide have been relatively more numerous than they have ever been before. The remainder of the deaths from poison, amounting to 377, are ascribed to accident or negligence, and it is to cases of this nature that most interest attaches in considering this matter in connection with the protective provisions of the Pharmacy Act. Comparing the total number of cases of poisoning by accident or negligence with the total number of deaths from accident or negligence, amounting to 14,908, it will be seen that the proportion is very much less than in cases of homicide and suicide, or only 2·5 per cent., although the deaths from accident and negligence were fewer in proportion to the population than in any previous year. We are therefore justified in concluding, as on previous occasions, that the obligations attaching to the keeping, dispensing and sale of poisons within the meaning of the Pharmacy Act continue to have been efficiently performed by the persons authorized under that Act to sell poisons. But there is still room for the extension of those obligations to other articles that are not now comprised in the schedule of poisons within the meaning of the Act. For instance, we find that carbolic acid has been the cause of death by accident in no less than 27 instances, and mineral acids have been the cause of death in 13 instances. Among the cases of suicide also carbolic acid has been the cause of death in 64 instances, and mineral acids have been the cause of death in 28 instances, so that in all no less than 132 deaths have been caused by carbolic acid and the mineral acids, which are not poisons according to law, or in other words no less than 18·5 per cent. of all the deaths by poison have been caused by these substances. This brings the deadly effect of these articles very nearly to an equality with that of the narcotics, which always rank as the most frequent causes of death, either by suicide or accident and negligence, and this fact constitutes a strong argument for the need of additional precautions in the sale of carbolic acid and the mineral acids. Another of the causes of death by accident which occupies a prominent position is lead, 106 cases of death being ascribed to it. In the absence of further information most of these deaths may, however, be referred to the effects of lead upon persons engaged in the lead works.

In the adjourned discussion of the sale of poisons question at the Chemists' Assistants' Association on Tuesday, the resolution proposed by Mr. Blackham "That it was not the intention of the framers of the Act to preclude unqualified assistants from selling poison," was carried *nem. con.*; but the larger number of those present refrained from voting. Mr. Millard also moved "That the meeting of the Chemists' Assistants' Association is of opinion that no sale of poisons should take place except under the personal supervision of a registered chemist, who would undertake the responsibility." This was carried by a large majority, and there can be no doubt that it meets the real point of the case. It would be a stultification of the Act if the qualification to sell poison were made the means of authorizing unqualified persons to do so, except under the direct supervision of those who have the qualification.

* * *

The next meeting of the Chemical Society will be held on Thursday, the 19th inst., when a paper will be read "On Frangulin," by Professor Thorpe and Mr. H. H. Robinson.

Transactions of the Pharmaceutical Society.

EVENING MEETING IN LONDON.

Wednesday, December 11.

An Evening Meeting of the Society was held at 17, Bloomsbury Square, on Wednesday, December 11. The chair was taken at eight o'clock by the President, Mr. Michael Carteighe.

The proceedings commenced by the reading of the following six papers, arising out of an investigation conducted in the Research Laboratory:—

"On Scopola carniolica." Introductory. By Professor Dunstan. [Printed at p. 461].

"On the Chemistry of Scopola carniolica." By Professor Dunstan and Mr. A. E. Chaston. [Printed at p. 461].

"On the Pharmacy of Scopola carniolica." By Francis Ransom, F.C.S. [Printed at p. 464].

"Observations on the Therapeutic Action of Scopola carniolica. By Sir Dyce Duckworth, M.D., F.R.C.P. [Printed at p. 466].

"On the Natural History of Scopola carniolica." By E. M. Holmes, F.L.S. [Printed at p. 468].

"On the Histological Characters of the Rhizome of Scopolia carniolica compared with those of the Root of Atropa Belladonna." By Thomas Greenish, F.C.S., F.R.M.S. [Printed at p. 471].

The reading of the papers gave rise to the following discussion:—

The President having invited discussion—

Mr. Groves said he was led to hope by what had been stated in Professor Dunstan's paper that scopola might turn out to be a valuable source of hyoscyamine. As to the cheapness of the liniment desired by Sir Dyce Duckworth he thought the price did not depend so much upon the raw material. Belladonna root was cheap enough, but it was in the making of the preparation that the cost was involved. He had not quite gathered from Sir Dyce Duckworth's remarks whether he had tested scopola with a view of ascertaining if it produced the physiological effects of hyoscyamus or those of atropa; but he believed it was understood that hyoscyamine had a decidedly different effect from that of atropine. He believed it had been maintained that the alkaloid of atropa in the natural state of the plant was really hyoscyamine, and that it was in some way converted into atropine. Possibly the root of atropa if treated with sufficient care might yield a larger proportion of hyoscyamine, and a less proportion of atropine.

Mr. Moss said that if he remembered rightly, Will, in his work on hyoscyamine, stated that hyoscyamine and hyoscine, particularly in the presence of an alkali, readily change to atropine. Professor Dunstan had told them that scopola did not contain atropine at all, and also that he obtained this hyoscyamine from scopola by precipitation in the presence of ammonia. He did not know whether Will in his paper alluded to ammonia, or whether his observations applied only to the influence of fixed alkalies. If so, there might be no inconsistency between what he said and what Professor Dunstan had stated. It was difficult to discuss all round papers like these, but he was sure the Society was to be congratulated on the manner in which the work was being done in the Research Laboratory. It was just the kind of work that it should go in for, and if all its work were done as well as that had been done, the Society would have every reason to be proud of its success.

Dr. Harrison wished to know, as a medical man, whether Sir Dyce Duckworth had found that the same dryness of the throat had followed the administration of scopola which was so often met with when giving tincture of belladonna. If its administration was not followed by that unpleasant symptom it would prove of greater value even than belladonna.

Sir Dyce Duckworth said that in his search for facts he had been quite in ignorance as to what he was to expect to find. He was told that scopola was an atropaceous drug and might possibly be useful where belladonna or henbane were used. Perhaps he might be said to have started on the belladonna track; he certainly had used it in cases where he should have used belladonna. In no case had the extract, in doses he had used, produced any dryness of the mouth. If it should turn out to be constantly the case that the preparations of scopola did not produce that symptom that would be a decided advantage over belladonna.

Professor Dunstan said that scopola would undoubtedly be a useful source of pure hyoscyamine. There was on the table a specimen of the alkaloid in a perfectly pure condition, and there was no difficulty in extracting it from the plant if proper precautions were taken. In all their experiments dilute ammonia was used, which Will had shown to be without immediate action on hyoscyamine. With reference to Will's observations about the conversion of hyoscyamine into atropine Ladenburg had recently adduced evidence to show that they were, in part at any rate, incorrect, Ladenburg's conclusions differing considerably from Will's. From what had already been done it seemed probable that scopola was a drug which might be used in place of belladonna; whether it could be used with greater advantage than belladonna, perhaps remained to be proved. He hoped that Sir Dyce Duckworth would not only continue his observations with respect to it, but also make a few trials with the pure hyoscyamine which had been obtained. It was doubtful whether physiological or therapeutic observations had yet been made on the action of *pure* hyoscamine and *pure* atropine.

The President said he was sure that all present would agree that the contributions by the various authors on the subject of scopola were of a very comprehensive character, and as far as they went, as complete as it was possible to have them in one series of observations. The duty of a corporate body in carrying on a Research Laboratory was obviously to do work which an individual alone could not perform. There were many distinguished men in the Society who were competent to do original work, as far as circumstances and the surroundings of ordinary life would permit them, but in a corporate research laboratory it was of great importance that conjoint work of that kind, dealing with the chemistry, the pharmacy, the physiological action, and the therapeutic action of drugs should be all duly recorded. In that instance they had been fairly successful, and even if the result of all that investigation should prove that scopola was not a bit better than atropa for medicinal purposes, he did not think the work would have been in vain. It was exceedingly important in the interests of pharmacy and advanced therapeutics that these alkaloids should be obtainable in a definite state. Those who were chemists knew how little they could say about those bodies. Their complexity and want of definite characters rendered it difficult to speak with certainty of the alkaloids of that class. As chemists and pharmacists they had to call in the aid of the physiologist and the therapeutist to see if it was possible to confirm the results they had arrived at. In conclusion he moved a cordial vote of thanks to Pro-

fessor Dunstan, Mr. Chaston, Mr. Ransom, Mr. Holmes, Mr. Greenish and Sir Dyce Duckworth for their contributions, which was carried unanimously.

The next paper was—

ON THE ROOT BARK OF EUONYMUS (WAHOO) AND ON EUONYMIN.

BY W. A. H. NAYLOR F.I.C., F.C.S., AND E. M. CHAPLIN, F.C.S.

The paper is printed at p. 472, and gave rise to the following discussion:—

The PRESIDENT said that this was essentially a practical paper. There was he thought no doubt about the value of the drug in the treatment of disease. It was one of the new remedies which had shown good cause for its establishment in this country.

Mr. MARTINDALE said that it sometimes happened that a drug would come into fashion for a time and then after a while drop out again, and he thought this had been to some extent the case with euonymin.

Mr. E. M. HOLMES said it was only fair to point out that euonymin was made in the United States, where it was much more easily prepared than in this country, the fresh bark being obtainable. He had had experience of euonymin and found it very valuable, but the quality of the preparations varied considerably, and Mr. Naylor had done well to point out the very great variations which existed in them. In his opinion the powder should not be used. The fluid extract which Mr. Naylor proposed was a far more satisfactory preparation than the powder.

The PRESIDENT quite concurred in the observations of Mr. Holmes. The Society was much indebted to Mr. Naylor for working out a process for a fluid preparation of that kind which could be made of a definite and uniform strength. Those eclectic remedies had done good service, but there was no doubt that the system adopted by the eclectics of converting everything into a powder was not a satisfactory one; and he must congratulate Mr. Naylor upon the courage with which he had come forward to propose that the so-called euonymin should be replaced by a preparation of definite strength.

A vote of thanks to Mr. Naylor was moved by the President and carried unanimously.

The next paper was entitled—

NOTES ON CALAMINE.

BY W. MURTON HOLMES.

The paper is printed on p. 474, and gave rise to the following discussion:—

The PRESIDENT said in his opinion calamine ought not to be in the Pharmacopœia at all. Those who were specialists in skin diseases preferred a soft impalpable powder such as could be obtained from the carbonate of zinc; and all the grinding in the world would not make calamine what they required. The difference was about as great as the difference between natural magnesite and the substance obtained in the ordinary process of precipitation. Magnesite might be ground to an exceedingly fine powder, and yet the particles would remain so hard that dilute acid had positively no action upon them; and the same remark applied to calamine. They could get a very fine powder but the particles were still so hard that it seemed to him they must necessarily be irritating. He thought the authorities of the Pharmacopœia had been somewhat misled in reintroducing a mineral which must in the nature of things vary in different parts of the world. He thought the reputation of calamine had been obtained from artificial preparations of carbonate of zinc.

Sir DYCE DUCKWORTH said he could confirm what the President had stated. To him calamine had always seemed one of the most inscrutable preparations in the Pharmacopœia. He was told many years ago that the average specimen of calamine consisted very largely of sulphate of baryta. At one time, having charge of a large department for the treatment of skin diseases, he had occasion to use calamine very largely, and he had long thought that it was introduced merely to produce a flesh-coloured tint in lotions. The finer powders were the better for the dermatologist; they could not be too fine. If anybody had been satisfied with calamine he took it that they had been supplied with a good preparation of carbonate of zinc, coloured in some way. There was a good deal of the conservative about him in these matters, and he was very loth to part with anything about which any good could be said, but he did think the time had come when calamine might be dropped out of the Pharmacopœia.

Mr. MARTINDALE said that calamine formed a denser powder than the factitious article manufactured from carbonate, and he thought much of its action was due to the fact that the powder would stick longer than that from the ordinary carbonate of zinc. There was a preference given to calamine, and he thought there was something in it. It was true it was difficult to obtain, but he personally should be sorry to lose it.

The PRESIDENT said he was afraid that a large part of the preference and love for calamine were purely sentimental. He did not think they knew what natural calamine was. His experience was that it was almost invariably prescribed with oxide of zinc. Experiments on his own skin showed that the difference between carbonate of zinc and calamine was very great.

Mr. GROVES said the reputation of calamine was acquired centuries ago, before the carbonate of zinc preparation was known. It must have had some beneficial effect or otherwise it would not have been adopted and retained so long.

Mr. MURTON HOLMES said the whole of his experiments tended to prove that a definite calamine could not be obtained, one that was almost entirely soluble in acids, and as it was generally used with oxide of zinc he thought it would be very much better if the Pharmacopœia ordered a definite mixture with a carbonate.

The PRESIDENT moved a vote of thanks to Mr. Murton Holmes for his paper, which was carried unanimously.

Donations to the Museum.

The CURATOR called attention to a fine series of minerals and other objects of interest presented by Mr. H. B. Brady, F.R.S.; to specimens of ouabain, crude and purified, presented by Messrs. Thomas Christy and Co., remarking that it had been stated in the Journal (*Pharm. Journ.* [3], xix., p. 162) to possess properties similar to but stronger than strophanthus; to two forms of botanical presses for plants, one exhibited by Mr. Thomas Christy, and the other by Mr. Helbing, both of which had the advantages of ventilation and portability. He then pointed out that a specimen of leaves of *Pilocarpus Selloanus*, presented by Mr. J. O. Braithwaite, showed that this species of jaborandi, which came from the Republics south of Brazil, was still in commerce, and said that it did not appear to be generally known that it contained less alkaloid than the Pernambuco kind. The specimen of Bissabol, brought by Mr. Umney, was now in the market in considerable quantity. It generally went to Trieste, and passed under the name of opopanax. True opopanax, however, had a much more disagreeable odour. The specimen of Johor ipecacuanha, presented by Mr. Maze, differed in appearance from what had been offered previously in its more starchy fracture, and in representing both the grey and red varieties met with in Brazil.

Proceedings of Societies in London.

BRITISH PHARMACEUTICAL CONFERENCE.

A meeting of the Executive Committee was held on Wednesday, the 4th inst., at 17, Bloomsbury Square, at 4·30 p.m.

Present;—Mr. Carteighe in the chair, Messrs. Atkins, Gerrard, Holmes, Martin, Professors Attfield and Green, Mr. Martindale (Hon. Treasurer), and Mr. W. A. H. Naylor (Hon. Gen. Sec.). The minutes of the previous meeting were read and confirmed.

The Chairman moved the resolution standing in his name. "That Mr. F. Ransom, F.C.S. (Hitchin), be appointed an Honorary General Secretary of the Conference." In speaking to the resolution he reminded the members that Mr. Ransom had already done good work in pharmacy, that he was loyal to the Conference, and that he had the business ability and could give the time requisite for the fulfilment of the duties that the Secretaryship demands. He had great pleasure, therefore, in moving that he be appointed.

Professor Attfield, in seconding the motion, referred to Mr. Ransom's progressive career from the scientific side, and Messrs. Atkin and Martin congratulated the Conference on his willingness to serve.

The motion was then put and carried unanimously.

The next business discussed had reference to the forthcoming edition of the 'Year Book.' Mr. Naylor stated that the final proofs had been passed by him, and that copies of the volume would be ready for distribution by the end of the year.

Provincial Transactions.

LEICESTER AND LEICESTERSHIRE CHEMISTS' ASSOCIATION.

The first of a series of meetings for the purpose of reading papers and discussing subjects of trade interest which the Council of this Association purpose holding, took place on Thursday, December 5, in the Leicester Guildhall Library, under the chairmanship of the President (J. G. F. Richardson, Esquire, J.P.). Upon this occasion a paper was read on—

The Medicine Stamp Act.

BY W. THIRLBY.

I think it only right to say at the outset that I am not responsible for the choice of the subject with which to commence this series of trade meetings, nor yet for the selection of the writer.

It is no affectation to say that I had much rather the duty had been entrusted to someone more able than I am to deal with it, and I can only ask your indulgence while I endeavour to lay before you an important item in our business life, and one that is constantly demanding the utmost circumspection.

I venture to say that no Act of Parliament has been passed that causes (and has caused) so much trouble to those most concerned as the law we have to consider to-night. The fact is, no one understands it; not even those who have to administer it, or else how would they give such contrary ruling, as in the case of a diarrhœa mixture label submitted to them on February 15, 1889, which they say makes the medicine liable to duty, and when re-submitted on the 19th, four days later, they say is not liable. Again, on May 8, a label for anti-neuralgic mixture was marked "liable," but in July following the same label was marked "not liable."

We all remember the hard fight Mr. Lamplough had to get his saline exempted, although to a non-legal mind, the law seemed decidedly in his favour, the wording of the Act being, "and all compositions in a liquid or solid state to be used for the purpose of compounding or making any of the said waters," *i.e.*, aerated waters.

In view of this uncertainty on the part of those who administer the law is it any wonder that chemists sometimes make a mistake as to the liability of their preparations to duty? and would it not be reasonable on the part of the Inland Revenue to inflict no fine for the use of any label unless the same was continued to be used after they had given notice to the user that it involved liability to duty? At various times there have been agitations against the duty, but as the Revenue reaps such a rich harvest there is no prospect of any relief in that direction. In the financial year 1887–8 there was received from 21,600 vendors the sum £5,400 and the stamps sold realized £191,797 10*s.* 6*d.*, therefore it is not at all likely that any Chancellor of the Exchequer will be willing to forego a sum of nearly £200,000 from his annual Budget, especially as the amount is growing and costs so little to collect. The Act is now hoary with age, and although we have a great respect for what is venerable we should be quite willing to part with our old friend, for except for the money it brings into the Treasury it does no good but a great deal of harm, for unscrupulous persons try to make a capital out of this stamp by quoting it as a guarantee of good quality, when as we know it is only a convenient way of hiding defects and covering a multitude of sins; *e.g.*, quinine wine with too little quinine in. The tax upon medicines was first imposed in 1783, rather more than a century ago, when an impecunious Chancellor of the Exchequer, looking about for some new tax by which to raise the wind, fixed on the quack medicines which were then, as now, having a large sale, and he estimated the revenue would be about £15,000. This Act remained in force two years, and in 1785 was replaced by another Act which in 1802 gave way to another which has been the basis of all subsequent legislation.

All the earlier Acts provide for a graduated license. Vendors in London, Westminster, or Edinburgh paying £2, and those in country places only 5*s.*, but about fifteen years ago this was altered to a uniform charge of 5*s.* in all places. I have always thought this was a mistake, as greengrocers, hucksters, or anybody else in any back street can now take out a license and compete with the chemist in an important part of his business. It is not often people want to be taxed, but for my part I would rather the tax had been raised instead of lowered, and so the trade kept in the hands of the chemist.

As matters now stand a person can go to a shop in a side street and buy one Beecham's Pill for a farthing, and it is currently reported stamped medicines are sold in a large number of shops in this town without any license being held by the vendor, the officers of the Inland Revenue giving as a reason for non-interference that the sum of 2*s.* 6*d.* which they would receive as their part of the fine, not being equal to the trouble and annoyance involved.

It is sometimes urged that as the public pay the tax, we ought not to complain; others say "Agitate against the stamp and get it removed;" but I have tried to show that this is impossible. It has been tried before and always resulted in failure and would do again. The only practical suggestion I can offer is that where any doubt exists as to the liability of a label, submit it to the authorities and act according to their ruling.

I have tried this recipe. Another plan that has been recommended to me, which I give for what it is worth, is do not push the so-called patent medicines, but give prominence to your own preparations. (Surely we can make a purifying pill as well as a cobbler can?) And then always discount those things that require such a large amount of advertising to make them go, being

assured that what professes to cure everybody of everything will end in curing nobody of anything.

The President, in inviting discussion, said he hoped that this subject would be well thrashed out, as he was sure the Council of the Pharmaceutical Society would be glad to receive the opinions from provincial Associations.

Mr. J. Young said that he had listened to Mr. Thirlby's paper with pleasure, but that he was slightly disappointed, insomuch as he had not attempted to define the Act more closely. He was of opinion that a higher fee for the licence would be gladly paid by chemists, but he doubted whether it would be of much avail, as then the large dealers would still be on a par with chemists, and they would pay for their customers. On the whole he would prefer the Act to stand as it is, but would like to see an alteration in its administration.

Mr. W. Rowe said that having himself been a sufferer under the Act he could quite appreciate its importance, but he thought it decidedly unfair that confectioners should be able to advertise their cough drops and such like preparations, as was done in Leicester, and yet get off scot free.

Mr. Lloyd said that in his opinion the chief difficulty was the obscurity of the Act, which not only was not thoroughly understood by chemists, but not even by those very people who were called upon to administrate it. He also considered that the sale should be limited to qualified persons, and that as there seemed no probability of ever removing the Act itself, he thought that some preparations might be exempted for dispensing and such like purposes.

Mr. W. Thirlby then briefly replied, mentioning the case of cod liver oil with the possessive case being taxed, stating that not long since he had seen an advertisement in the local paper of a "quinine wine protected by Government Stamp." He had had customers inform him that the stamp implied a guarantee of the purity and efficacy of the drugs enclosed, and he again urged his brother chemists to send their labels to Somerset House, as they would be sure to get a reply as to whether they were liable or the reverse.

The President, in thanking Mr. Thirlby for his paper said, I regret the small attendance of chemists in business, as the Council of this Association are initiating such meetings as the present, differing as they will from the educational branch which is being carried on with such success in the hope of arousing their interest. But everything has a beginning, and I hope that when other subjects come forward there will be a larger attendance. I deeply sympathize with the trade concerning the method in which the Stamp Act is carried out, and the way in which chemists throughout the country are harassed by the Somerset House authorities. It is such an easy matter for an inspector to go into a chemist's shop and purchase four or five articles and then submit them to Somerset House and obtain his share of the fine imposed. My views to a considerable extent are in accordance with those expressed by Mr. Thirlby, and I should like to see the fee for the license raised to a guinea in the provinces, but you must remember that chemists themselves are to blame for its being originally lowered. The question is, Are you in favour of the total abolition of stamp duty, or are you in favour of its retention, but with a modification of its administration? Personally I am in favour of the latter course. Originally it was only intended to apply to quack medicines, but as you have seen it has grown to such an extent that probably the Revenue will soon be deriving a quarter of a million per annum, and as it costs so little to collect there is no likelihood of its repeal. Indeed, I should be sorry to see it abolished, as there would be immediately a perfect flood of quack nostrums. But that pharmacists, who are often called upon to cater for the public by giving them simple remedies, should be taxed is an insult to an educated body of men. I must here, however, allude to the courtesy always shown by the Somerset House authorities, for if you only send them a label you may, as Mr. Thirlby has said, always depend upon receiving an answer stating whether it is liable or not. But where I fear chemists often make a mistake (and this is a point I notice has not been touched upon at the recent Newcastle meeting) is in not also sending up the hand bill or the newspaper advertisement in which the medicine is more fully described. I feel strongly that some steps ought to be taken to obtain an amended Act whereby retail chemists should be exempt from this obligation. I should like a small committee formed to memorialize the Council of the Pharmaceutical Society on the subject; and accordingly I propose that Messrs. Thirlby, Butler, Rowe, and Burford, together with the Secretary, be requested to draw up a memorial.

This was seconded by Mr. J. Young, and with the addition of the President was duly carried.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

THE SALE OF POISONS BY UNQUALIFIED PERSONS.

Sir,—There is a point in connection with the Society's action against unqualified men, which deserves more consideration than has hitherto been given to it, *i.e.*, the way in which the question bears upon "qualified" assistants.

When I was an assistant I remember I used to be very angry because after I had taken the trouble and pains to study in the Society's school and to pass my examinations I had as competitors for nearly every berth I sought men who had taken no such trouble, and who were, in consequence, prepared to accept lower rates of pay than I expected.

The Society's action may therefore, in this connection, be of considerable service.

1. By making qualified men worth more, *cæteris paribus*, than those who have not passed their examinations.

2. By giving unqualified men a stimulus to work. We all know that one of the great difficulties we have with apprentices and unqualified assistants is to get them to study. Perhaps if we put a premium upon qualified men this difficulty will be somewhat lessened.

Let us remember that it is the young, qualified men of to-day who will constitute the Society of the future. They will be the pharmacists of a few years hence, and if we can get them when young to attach themselves to the Society the probability is that they will grow up in its best traditions, and will carry these on to the time when they will be in business for themselves. And anything we can do to benefit their present position is likely to attract them to our ranks.

I fancy I hear somebody saying, What is to become of the unqualified "juniors," "improvers," and "chronics"? Well, they may improve into "qualified men!" But if not, they must take their right place behind those who have passed the Society's examinations, *i.e.*, they will be worth less, *cæteris paribus*, than the latter are.

EDWARD CULLINAN.

Westminster Hospital Medical School, S.W.

Note.—In consequence of the unusual space taken up in this week's journal by the report of the proceedings at the Evening Meeting on Wednesday, we are compelled to defer the publication of the proceedings of the Pharmaceutical Society of Ireland and several other communications.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Hill, Fraser, Morrison, Baxter, Aston, Cripps, Reynolds, Proctor, Wright, Oxen, Abraham.

THE DETERMINATION OF THE DIASTASIC POWER OF EXTRACT OF MALT.

BY R. A CRIPPS, F.I.C.

The above title indicates the scope of this brief note; it is not my intention to enter into the question of the value of extract of malt as a nutrient, but simply to record a fact of considerable importance in connection with the determination of its value as a digestive of starchy foods.

Considerable importance is attached to the estimation of this digestive power; it is therefore very strange that published results should show such extraordinary differences, *e.g.*, Messrs. Dunstan and Dimmock (who were, I believe, the first to introduce a ready method for making this determination) state that the best malt extracts of the market should completely digest *one-seventeenth* of their weight of starch in several (three?) hours (*Pharm. Journ.*, [3], ix., p. 733). Carl Jungk, in a paper in the *American Journal of Pharmacy*, June, 1883, and *Pharm. Journ.*, xiv., p. 104, describes a method whereby the effect of malt extract upon starch mucilage is tested at intervals of one minute, and says that good extract of malt should convert *its own weight* of starch within ten minutes at 100° F. Later still, *Pharm. Journ.*, xv., p. 236, T. S. Dymond compares the two methods above referred to, and after condemning Jungk's method, states that a good malt extract should completely digest one-fifteenth of its weight of starch in half an hour at 140° F.

I think the key to these divergencies will be found in the experiments recorded below. It is evidently not in the fact that malt extract has improved during late years, for Mr. Dymond's experiments are of later date than those of Herr Jungk.

allow to cool to about 100° F., and make up the measure to 100 c.c.

2. Dissolve 5 grms. of the sample of extract of malt in water sufficient to produce 50 c.c. of solution.

3. Dissolve ·1 grm. iodine in 100 c.c. of water by the aid of ·2 grm. of iodide of potassium.

50 c.c. of starch solution is introduced into a flask or bottle and kept in a water-bath at a temperature of 98° to 100° F. until it has attained that temperature, when 5 c.c. of the malt solution is added (also at 98°–100° F.), gently shaken to mix thoroughly, and replaced in the water-bath; after five minutes and at intervals of five minutes (or less if found desirable) 4 c.c. of the liquid is poured into a test-tube containing 1 c.c. of the iodine solution. A good extract of malt will give no indication of starch or dextrin after ten, or at most, fifteen minutes, while one which still gives a distinct coloration after thirty minutes should be rejected as quite unfit for use; that is, *extract of malt should completely digest its own weight of potato starch in* 10-15 *minutes at* 98°-100° F.

It will be remarked that I have selected potato starch or arrowroot for this test, other starches giving widely differing results. The accompanying table will indicate the importance of using one or other of these kinds of starch, and, as mentioned above, probably suggests an explanation of the widely differing results of other observers.

The different mucilages were all prepared as described above, and quantities of mucilage representing ·05, ·1 and ·5 grm. of each starch (dried) introduced into the bottles, the bulk of each being made up to 50 c.c. with distilled water, and ·5 grm. of extract of malt added to each.

	0·5 grm.				0·1 grm.			0·5 grm.			
	5 min.	15 min.	30 min.	45 min.	5 min.	15 min.	30 min.	5 min.	10 min.	15 min.	30 min.
Arrowroot . . .	Done.	—	—	—	Done	—	—	Bht brn	Palebrn	Done*	—
Maize	Bluish	Bluish	Done	—	Indigo	Indigo bl	Violet	—	—	—	Clear bl‡
Potato	Done.	—	—	—	Done	—	—	Bht brn	Palebrn	Done†	—
Rice	Bluish.	Pale bl.	Done	—	Blue	Bluish	Pale vlet. bwn	—	—	—	Cl. vlet.‡
Wheat	Brownish violet.	Violet brown.	Violet tint	Very pale violet	Brown-violet	Violet	Purple	—	—	—	Cl. vlet.‡

Nor do I think that the English-made extracts of malt are inferior to those of foreign manufacture, as might be suggested by the low results of the English experimenters; on the contrary, from the experience of large numbers of determinations, I am strongly of opinion that (generally speaking) English extracts are distinctly superior to either American or German ones.

In the first place I will describe the method I am in the habit of using, for which I do not claim any originality, it being simply a modification of the foregoing processes:—

1. Prepare a mucilage by mixing 1 grm. of potato starch or arrowroot (dried in an oven at 212° F.) with 10 c.c. of cold water, add 100 c.c. of boiling water, and boil the whole for half an hour;

* Completed in twelve minutes.
† Completed in twelve and a half minutes.
‡ These colours refer to the liquid five times diluted; the colour was too deep to be seen before dilution.

CHEMICALLY PURE NARCEINE.*

BY E. MERCK.

In a note entitled "Narceine and its Salts,"† D. B. Dott refers to the contributions to the knowledge of narceine that have appeared during the last three years. As the results to some extent of my work are spoken of in terms of unfavourable criticism I feel called upon to bring forward the following facts:—

Chemically pure narceine was not hitherto obtainable in commerce. I have, on the contrary, pointed out that the samples of English narceine examined by me during a series of years did not consist of the free base, but were basic salts—hydrochlorides, acetates and

* See the communication under the same title in the *Chemiker Zeitung*, 1889, p. 525, translated in the *Pharm. Journ.*, [3], vol. xix., p. 1034.
† Read at the Newcastle meeting of the British Pharmaceutical Conference (*Pharm. Journ.*, Oct. 26, p. 335).

sulphates—and that in addition they contained other substances in varying quantities.

Since a theory has value only when it is supported by experimentally proved facts, I have not, in the absence of such experiments, spoken more definitely upon the chemical nature of these samples of narceine containing acid, but in print have only stated that they are "probably to be considered as basic salts."

Dott appears to have overlooked this, since he ascribes to me that I look upon these substances as mixtures of free base and normal salts. However I willingly concede that the expression selected by me in one place might furnish opportunity for an error in the sense indicated, though my intention was to mention in that place the results of an analysis showing the presence of hydrochloric acid in narceine, simply because that very interesting fact was thus brought under notice in the most drastic manner.

As to the collision with Wright's investigations upon narceine hydrochloride, I may remark that my object was to illustrate the difficulties attending the attempt to remove the whole of the acid from commercial narceine. With that object I selected a sample of narceine containing hydrochloric acid, and in that respect corresponding to the majority of the preparations tested, but the same results hold good for narceine containing either acetic acid or sulphuric acid.

The fact then observed was that narceine crystallized out from 50 per cent. alcohol, and even in the presence of free ammonia, still contained hydrochloric acid, and that fact was at any rate so surprising and so new that a closer investigation appeared to be justified.

It can easily be ascertained by experiment that, contrary to Dott's statement, narceine containing hydrochloric acid cannot be perfectly freed from the acid by recrystallization.

In the case before us I cannot agree with the views of Dott upon the limited importance of the melting point as a means of establishing the purity of certain alkaloids, for it is only when narceine is absolutely free from acid and other foreign admixtures that it melts above 170° C.

In respect to the use of the alkaloid it was expressly stated that "good commercial narceine might fully suffice for therapeutic use;" but the chemist must be more thorough-going in his requirements as to the purity of narceine, and the object of my communication was to show that.

There has also come under my notice the communication from P. C. Plugge,* which I am equally unable to leave unanswered.

Herr Plugge appears to be annoyed because I have left unmentioned his work upon narceine, the chief point of which is the not very novel classification† of the opium alkaloids into strong and weak bases. But there was no ground for me to quote Plugge's results, as I occupied myself with the preparation of chemically pure narceine, and in doing so could not mention all the communications that have appeared upon that alkaloid, but only those standing in direct connection with my subject.

However, it is by no means the case that I have anywhere asserted in opposition to previous authors that narceine is not a weak base. The purport of the passage which Plugge quotes from my communication is to some extent distorted through the absence of subsequent passages and an opinion is attributed to me which I never held and have never expressed. What I wished to bring out was that chemically pure narceine, contrary to previous statements, possesses a *weak alkaline reaction*, and that it manifests quite a *peculiar affinity for acids*, on which account it holds an exceptional position among the opium alkaloids.

The assumption by Plugge that narceine and acetic acid do not combine chemically is a false one; presumably he could not have worked with chemically pure narceine. In a water solution certainly decomposition does take place; but if chemically pure narceine be moistened with acetic acid, allowed to dry, and the residue powdered, the odourless powder so obtained does not either by weeks of exposure to the air or by four hours' heating to 70° C., lose the acetic acid to which its strong acid reaction is due, a certain proof that this is chemically combined.

Because this fact cannot be brought into accord with one of Plugge's conclusions, he contents himself with describing this experiment as "*somewhat strange*, and one to which no value is to be ascribed." I feel myself compelled to declare in this place, once for all, that in future I shall not be induced to take seriously into consideration any statements as to the chemical nature of narceine, if they are not based upon experiments with chemically pure narceine.

The extremely contradictory results which I have myself obtained through a series of years with the commercial narceine formerly accepted as pure, was the occasion of my taking part in the settlement of the chemical properties of chemically pure narceine, and in this sense I hoped to interest chemists by my small communication.

In conclusion I would take this opportunity to mention that I have succeeded in obtaining two of the rarest opium alkaloids, namely, *laudanine* and *protopine*. I found their properties to correspond essentially with the statements made by Hesse at the time he discovered them. Laudanine, especially, on account of its analogy to morphine, appears to be of great interest. It is soluble in caustic soda solution and can be converted by methylation into a new base, which chemically resembles codeine.

* *Pharmaceutical Journal*, Nov. 23, 1889, p. 401.

† See Hesse's classical papers, *Annalen*, cliii., Suppl., viii., etc.

CHANGES PRODUCED IN LYCHNIS VESPERTINA BY A PARASITIC FUNGUS.

Messrs. Magnin and Giard describe the remarkable changes produced in the flower of the common wild white campion by the attacks of a parasitic fungus, *Ustilago antherarum*. *Lychnis vespertina* is dicœcious, and the male and female plants are essentially different forms, differing not only in the presence or absence of the male and female organs respectively, but also in the size of the flower (those of the male plants being smaller), the venation of the calyx, etc. Hermaphrodite individuals sometimes occur, but are simply female plants in which stamens are produced by the presence of *Ustilago antherarum*. This fungus can develop its spores only within the anthers of a flowering plant. In such plants of *Lychnis vespertina* its only visible outward effect is a slight deformation of the anthers and shortening of the filament. In the female plant it brings about (1) the production of stamens; (2) atrophy of the style and of the upper part of the ovary; (3) a greater or less elongation of the internode between calyx and corolla, this being also characteristic of the male plant. It also frequently causes tetramery or pentamery of the flowers, lobing of the margin of the petals, and a change in the venation of the sepals. M. Magnin traces a similarity between these phenomena, and those of the castration of animals caused by parasites.

The Pharmaceutical Journal.

SATURDAY, DECEMBER 21, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

POISONING BY "WATER GAS."

THE death of two men at the Leeds iron works last month, which appears to have been regarded as a somewhat mysterious occurrence, has again been the subject of inquiry before the coroner. In the interval Dr. STEVENSON has been engaged on behalf of the Home Office in conducting a special investigation as to the cause of death, and as to the suggested possibility that it was the result of some other cause than the carbonic oxide gas, which is a prominent constituent of the "water gas" used as fuel at the Leeds forge. Dr. STEVENSON'S report has now been made, and it is decisive in attributing the death of men to poisoning by carbonic oxide. The evidence in support of this decision is so strong that the further question as to any other poison is disposed of by the simple statement that the bodies did not contain alcohol or any other poisonous substance besides carbonic oxide. The presence of the last-named substance in sufficient quantity to account for death was directly ascertained in both cases. The verdict of the jury was accordingly that the two men died from inhaling water gas and at the same time an opinion was expressed that the gas was not at the time sufficiently odorized to have enabled the men to detect its presence in the air of the room where they were. The death of these men furnishes an illustration of the danger attending the use of gaseous fuel made by the decomposition of water by carbon at a high temperature. On several occasions this danger has been referred to in this Journal as being one of the great obstacles to the use of such gas for fuel. Within the last few years the introduction of "water gas" for that purpose in the United States has been followed by such an extraordinary increase in the number of deaths from gas poisoning that in Massachusetts its manufacture is now prohibited. Most of our readers will be aware that what is termed "water gas" is by no means a novelty, and that for at least fifty years past it has been used in various metallurgical operations. The attempts to employ it as an illuminative agent and as fuel for domestic purposes are more recent, and in both cases the inodorous character of the highly poisonous carbonic oxide admits of a leakage in the pipes being overlooked until fatal effects are produced. This seems to have been what happened at the Leeds forge.

Mr. Blair, of Cork, requests that publicity should be given to a correspondence that has passed between him and the Board of Inland Revenue in reference to the notices which have lately been given that chemists are liable to a penalty of £100 if they sell methylated spirit between the hours of 10 p.m. on Saturday and 8 a.m. on Monday. Mr. Blair urges that with chemists the sale of methylated spirit is principally confined to the use of the spirit for burning under bronchitis kettles and inhalers used by invalids suffering from congestion of the lungs, bronchitis or diphtheria, and he submits to the Board of Inland Revenue the question whether when the use of a bronchitis kettle is ordered by a physician on a Sunday, or at midnight on Saturday, he is to refuse to supply the spirit necessary for that purpose and thereby endanger the life of the patient. Mr. Blair adds that it is to meet such emergencies as these that he keeps an assistant on duty from Saturday until Monday, and he desires to have the opinion of the Board, as he thinks it is the duty of all good government to insure the welfare and health of its subjects. The reply of the Board is not consolatory, being simply to the effect that it has no power to modify in Mr. Blair's favour the provisions set forth in section 26 of the Revenue Act, 1889.

* * *

In the *British Medical Journal* for December 7 (p. 1288) reference is made to some tabloids of "prepared saccharin" which upon examination proved to be "chiefly composed of common sugar." They were received from a Nottingham medical man, who obtained them "from a patient who in spite of the most careful treatment still passes a large quantity of sugar." The label assumed to have belonged to the package is described as bearing the name of "a drug company" of "cash price dispensing chemists," and the following words: "Prepared saccharin (Dr. Fahlberg's), or sugar substitute, takes the place of sugar for all sweetening purposes, and especially in the case of persons to whom the use of sugar is forbidden or undesirable. It has proved an inestimable boon to sufferers from diabetes, Bright's disease, and other kidney affections," etc. Our contemporary very justly stigmatizes such tabloids as a "particularly cruel fraud," and regrets that through the culpable negligence of local authorities the Sale of Food and Drugs Act is applied to so limited an extent as to allow of the widespread sale of such a preparation. We would remark, however, that the power of setting the law in motion is not confined to local authorities, but extends to any person who is aggrieved by being supplied with an article not of the nature, substance and quality demanded.

* * *

The present mayor of Birmingham, Mr. Francis Corder Clayton, has a record which presents several features of pharmaceutical interest. After serving his apprenticeship with the firm of Harvey and Reynolds at Leeds, he became a student at the School of Pharmacy, and figured among the prizemen for the year 1865. Subsequently he was engaged by and eventually became a partner in the firm of D. and S. Sturge, of Birmingham.

Pharmaceutical Society of Ireland.

MEETING OF THE COUNCIL.

The monthly meeting of the Council was held on Wednesday, the 4th inst., at No. 11, Harcourt Street, Dublin, at three o'clock.

The President, Mr. Charles Evans, in the chair.

The other members of the Council present were the Vice-President, Mr. Wells, Messrs. McCormack, Merrin, Beggs, Hodgson (Treasurer), Hayes, Dr. Burnes and Professor Tichborne.

A letter was read from Mr. F. W. Smith, Registrar of the Pharmacy Board of New Zealand, acknowledging the receipt of a copy of the Society's Calendar for 1889.

Letters were read from Mr. Harry Carter Draper, Dr. Tweedy, and Dr. Whitla returning thanks for their re-election as Examiners.

A letter was read from Dr. Burnes acknowledging the receipt of an intimation of his election to a seat on the Council.

A letter was read from Mr. James T. Watterson acknowledging receipt of letter from the Registrar in reply to his former communication.

A letter was read from Mr. J. J. Sewell requesting that his name should be struck off the list of members of the Society.

The Registrar, Mr. Ferrall, mentioned that he was in communication with Mr. Sewell and he thought it likely that he would withdraw his resignation.

Mr. Ferrall was directed to write to Mr. Sewell stating that the Council regretted his resignation and trusted that he would reconsider it.

A letter was read from Mr. F. W. Hatton, a member of the Society who had gone to reside in Dorchester, forwarding two guineas, the amount of his subscription to the Society for the years 1889 and 1890.

On the motion of Mr. Hodgson, seconded by Mr. Hayes, the thanks of the Council were voted to Mr. Hatton for continuing his subscription to the Society, notwithstanding his non-residence in the country.

A letter was received from Mr. William Cooper Newbold requesting that his name might be replaced on the Register.

On the motion of Mr. Hayes, seconded by Professor Tichborne, it was resolved that the name of Mr. Newbold should be restored to the Register upon his payment of the guinea fee, as required by the rules of the Society.

A letter was read from Mr. John Scanlan, of 6, Longford Road, Cork, applying to be placed on the Preliminary register, and enclosing University certificates.

The Registrar was directed to write to Mr. Scanlan stating that the Council had not power to accept the certificates which he had forwarded, as they did not include all the subjects that were required by the General Medical Council.

A letter was read from Mr. Patrick Kelly, a member of the Society, in reference to the one hundred hours' chemistry course. The writer urged that the resolution adopting that course was only carried by the casting vote of the Chairman. In the course of the discussion on it the mover had stated that the schools would arrange days and hours to suit the students; but in place of this happening, the schools were now closed against them altogether, except in the day and on payment of a double fee. What employer, it was asked, could allow his assistant out for three hours in a day, even on three days of the week? And even if a night-school should be opened it would be hard on a young man whose ordinary work was from perhaps nine in the morning until ten at night to have to spend three hours on three evenings of the week in an atmosphere of sulphuretted hydrogen. It might be said by some that the one hundred hours' system had not yet got a fair trial. The late President, in his address of October, 1888, congratulated the Society on the efficiency of its candidates, saying that only 33 per cent. of them had failed that year as against 50 per cent. in the preceding year, and he attributed this improvement to the one hundred hours' system. But the fact was that the system had only been compulsory from the July of 1888; and the candidates at the July examination had previously taken out their chemistry. He wrote to the President, pointing out his mistake, and the President acknowledged the letter, but did not correct his statement. Now, in 1889, after the system had come into full work, according to the President's address of October last, the failures during the year had been 46 per cent. So much for the one hundred hours' system. In conclusion the writer submitted that the Council should leave the safety of the public in the hands of the Examiners.

Mr. Hayes said this system pressed very hardly upon young men, while he did not think it would make any difference in the quality of the candidates presenting themselves. The examination was quite good enough as a test without the 100 hours' bench work or lectures. If the Council could with a good grace withdraw from this rule now, he believed that it would be beneficial to the Society, for the effect of the rule at present was to prevent young men who could not put in the 100 hours from presenting themselves at the examination, though they would otherwise be willing to do so.

Mr. Hodgson stated that at the time the rule in question was under discussion he asked two or three persons who were authorities on the subject of chemistry, what period of study was requisite in order to give the student such a knowledge of chemistry as would make him a good and safe compounder, and all were of opinion that 100 hours was not an excessive period, while one was in favour of a larger amount of time. The consensus of opinion was in favour of the 100 hours' bench work; and if the Council were to reduce that now, it might lead to the impression that they wanted to lower the standard of education, which it was not the desire of the Council to do at all. If it was unnecessary, no doubt it was a hardship on the young men. If eighty hours were sufficient to make a safe compounder and licentiate of the Society, well and good; but on the other hand, where the change had been so recently made and approved of by the Privy Council, if they were to seek to alter it so soon, the impression would be produced that they were not stable.

Mr. Merrin said he thought too much importance was attached to the chemistry lectures and not sufficient importance to those in pharmacy. He would like to see the pharmacy examinations far stiffer than they were. He could not see the importance of so much chemistry at all. It did not turn up at the compounder's counter.

The Vice-President suggested that the report of the Committee, to whom a former letter of Mr. Kelly's had been referred, and also a motion of Mr. McCormack on the subject of the establishment of a night school of chemistry in connection with the Society, should be considered now.

The Report was read. It stated that the Committee consisted of the President, the Vice-President, Professor Tichborne, Mr. Hodgson, Mr. McCormack, Mr. Beggs and Mr. Merrin. They came to the resolution of addressing a letter to the Board of the Apothecaries' Hall, asking them whether they could place their class room and chemical benches at the disposal of the Society for the purpose of holding evening classes for instruction in chemistry and pharmacy, and on what terms. The subject of Mr. Kelly's letter was deferred for the present.

The Vice-President said the Committee were impressed by the consideration that the one hundred hours' rule had been only recently passed into law, and had in fact hardly come into action yet, as only a few certificates under it had been presented up to the present. It was nonsense therefore to say that it had been a failure. Give it a chance: and if they should afterwards find that the candidates could not get one hundred hours they could reduce the number of hours. But the Council were now trying to establish a school that would meet the requirements of their students, and if they should succeed in doing so, he did not see what difficulty there would be in getting the one hundred hours. He was informed that there was a school in Dublin at present that was well suited for their purposes. If they were now to change a system which they only adopted twelve months ago it would look as if they did not know their own minds.

Mr. Merrin said that at the time when the rule was adopted, the Medical Schools of Dublin were in a different state from what they are at present. Now the Ledwich and Carmichael Night Schools were closed.

The Vice-President: Two members of the Council were sent to examine the Technical School, which is now in existence, for the purpose of seeing whether it would meet our requirements, and they have reported that it would.

Mr. Merrin: Did we represent to the authorities of that school what we require?

The Vice-President: They applied to us in the first instance, and we sent the two members to inspect the school. They reported to us that certain things were necessary, and that the school authorities were prepared to meet us in every way,—in fact guaranteed that our requirements would be carried out.

Mr. Merrin: Has that school been added to the list of those whose certificates we receive?

The Vice-President: It has.

Mr. Merrin said that according to present arrangements at that school students there would be able to get only one hour a week.

Dr. Burnes: The practical work there covers more than one hour a week. I sent one of my young men there to make inquiries, intending to pay his fees, and they said they would be able to give the hundred hours in three months—certainly during the winter session.

The President: Night work?

Dr. Burnes: Night work.

Mr. Hayes: That is exactly what we want.

Mr. Hayes moved that the report of the Committee be adopted; that the subject of Evening Classes be referred back to the Committee; and that the subject of Mr. Kelly's letter be deferred for the present. They might continue the existing system for twelve months; and if they should then find it to be impracticable they could reasonably go before the Privy Council, and say that the thing had broken down and required to be re-adjusted.

Dr. Burnes seconded the motion.

Professor Tichborne remarked that originally he did not vote for the hundred hours' system, but he was inclined to let the question rest for the present.

The motion was unanimously agreed to.

The Vice-President moved that a Committee called the "House and General Purposes Committee" be appointed. Matters were constantly cropping up in order to deal with which a standing committee of the kind he proposed was requisite.

Mr. Beggs seconded the motion, which unanimously passed.

On the motion of the Vice-President, seconded by Mr. Beggs, Messrs. Hodgson, Hayes, Grindley, McNaught, Beggs, McCormack, and Professor Tichborne were appointed the House and General Purposes Committee for the present year.

A report from the Law Committee was adopted.

The Vice-President called attention to a report which appeared in the *Chemist and Druggist* of November 9, of what took place on the occasion of a deputation from the Druggists' Society waiting on the Solicitor General for Ireland in reference to a Pharmacy Bill. A number of statements were made on that occasion which were absolutely untrue. Of course, they might not have a full account of what was said, but the statements that appeared in the report were certainly contrary to the fact. At first he thought that it would be better to take no notice of these statements, but he afterwards came to the conclusion that passing them over would look as if they were indifferent to the interests of the licentiates. It was stated that: "In 1888 a measure was brought before the House of Lords, referred to a Select Committee, and subsequently brought on to the House of Commons, where it was so unanimously rejected that not one member could be found to propose its adoption." How any man in his senses could have made a statement like that he was unable to understand. They all knew that the Bill went to the House of Commons, was read twice there unanimously, and referred to a Select Committee. Yet they were told that it met with such opposition in the House of Commons that a member could not be got to propose it. The report proceeded: "Amendments were afterwards brought forward by different Members of Parliament, embracing the requirements of the traders throughout the country; and so strong was the feeling on the subject that the pharmaceutical party felt it impossible to do aught but yield to public opinion, and through the agency of their President, came to an agreement with the chemists and druggists to adopt the provisions of the amendments, and the Bill being thus revised, would certainly have become law but for the session being almost ended, owing to which the amended Bill was slaughtered with a number of other innocents." He (the Vice-President) was not aware that their Bill was at any time in the House of Commons when there was not present a member to propose it; but if it did come to such a position in the House of Commons it was after it had become the Druggists' Bill and not while it was the Bill of the Pharmaceutical Society. They were all glad that the amended Bill did not pass; and there were members of the House of Commons prepared to oppose it. He therefore moved — "That the report in the *Chemist and Druggist* of November 9 of a deputation from the Druggists' Society having waited on the Solicitor General in reference to a Pharmacy Bill be referred to the Law Committee to report to the Council on."

Mr. McCormack seconded the motion.

Mr. Hodgson said it was desirable that the Law Committee should communicate with Messrs. Clay and Close, in London, as to what passed in connection with the Bill.

The Vice-President: Do you know, Mr. Hayes, was it the case that we had no member ready to propose the Bill when it came on in the House of Commons?

Mr. Hayes: The member who was to have proposed it was not there and it was taken up by some one else.

Mr. Beggs: Sir James Corry was to have proposed it, but he was not present. That was the amended Bill.

The Vice-President: The Bill was so well cut up that we were glad that it did not pass.

Professor Tichborne: The Bill that left the House of Commons did not resemble the original Bill as promoted by this Society at all.

Mr. Hayes: Our original Bill passed the House of Lords, and was read a second time in the House of Commons.

The motion passed unanimously.

On the motion of the Vice-President, seconded by

the President, Mr. William Hanna, of Main Street, Bangor, co. Down; Mr. Charles Marshall, of 39, Hamilton Street, Belfast; and Mr. John Smiley Anderson, of 47, Market Square, Lisburn, were elected members of the Society.

On the motion of Mr. Baxter, seconded by Mr. Doran, Mr. W. H. I. Madden, of 2, Gloucesterville, Fitzroy Avenue, Belfast, was elected a member of the Society.

On the motion of Mr. Whitla, seconded by the Vice-President, Mr. E. P. Murray, of Clones, co. Monaghan, was elected a member of the Society.

On the motion of Mr. McCormack, seconded by the Vice-President, Mr. Thomas William Robinson, of 112, Upper Georges Street, Kingstown, was elected a member of the Society.

Some financial business having been disposed of the Council adjourned.

Provincial Transactions.

LIVERPOOL CHEMISTS' ASSOCIATION.

The eighth general meeting of the fortieth session was held at the Royal Institution on Thursday evening, December 12, 1889. The President, Mr. A. H. Samuel, F.C.S., in the chair.

The minutes of the previous meeting were read and confirmed and several donations announced.

Dr. Symes exhibited a specimen of synthetically prepared pure phenol which he said had been put in the market by a German firm at a price but little over that of ordinary phenol from tar, against which it possessed the advantages of freedom from all tarry odour, a higher melting point (106° to 107°) and a greater solubility in water. A 5 per cent. aqueous solution was almost odourless. He could not say if it were equally antiseptic with the ordinary acid; on receiving a further supply he would be pleased to present a specimen to the museum, where members could examine it at their convenience. He also called attention to a specimen of a new antipyretic, phenyl-urethan, which had been introduced by Professor Giacomini, of Turin. It was a white crystalline powder, insoluble in water, the dose being 8 grains.

The President now called upon Mr. Buck to read his note on—

Infusum Senegæ Concentratum.

BY A. S. BUCK.

It is not my intention to say more than is necessary for the purpose of bringing to your notice a preparation which may be of interest in local pharmacy at this season.

I claim nothing original, but simply introduce it to you as the outcome of incidents which have cropped up recently in the ordinary routine of a small business.

The rule in all first class pharmacies will be to have infusion of senega and all other infusions and decoctions freshly prepared.

During the day this may generally be done with ease, though occasionally the patient may not be able to grant you the time necessary for its production. At night there will be greater difficulty in adhering to this rule, and hence the need for having at hand an article which will keep well and be as nearly as possible equivalent to what is ordered. Medical men are now ordering concentrated infusions as component parts of mixtures. Only last week I had ℥x. inf. senegæ conc. ordered in a six-ounce mixture. It is for these occasions that I intend the preparation to which I am calling your attention this evening.

My attention was first drawn to the concentrated preparation during an engagement where 1–7 strength was the law, and I suppose almost every medical man who dispenses his own prescriptions, and perhaps four-fifths of the chemists make their infusions in the same way.

The concentrated preparation was dark coloured and produced an infusion darker than it should have been.

It had little or none of the aroma of senega.

The acrid or soapy taste was wanting. In fact, the impression conveyed to my mind was that senega had not been used in its manufacture, and that a decoction of prunes would have produced as good results.

The sample I bring forward to-night seems to me to have all the requirements of a good aqueous solution.

1. The colour is not too deep.
2. The aroma is perfect.
3. The taste fully bears out my statement, and if the appearance is not quite so elegant as that of some of the bought samples, I think it will justify itself on dilution, and where gentlemen make it for home use the heavy deposit of saponin will not matter.

The process I employ is simply the percolation and repercolation process with cold water, mentioned in the *Pharmaceutical Journal* some two or three years since, and the simple apparatus shown will fully illustrate the proceeding.

The percolators are 1*d.* lamp glasses, which answer very well. The stand I had made for the purpose, but I now think that one of the little stands used for keeping eggs on end would answer all the purpose. These glasses and the stand I find most useful on the dispensing counter for many purposes, in fact, there are few days when they are not put into some use.

The quantity of water used is little in excess of the volume of products; no evaporation or heat is required, and to these reasons I put down the light colour and better aroma.

In making, say, 1 pint of product, I take 8 ounces of the root, grind to a uniform coarse powder, and distribute through five glasses. This seems to be the lowest number which can be employed for the thorough exhaustion of senega root by this process. Into No. 1 glass I put, say, 3 ounces of water; any percolate collected is passed into No. 2. More water being put into No. 1, and so on until 16½ ozs. is collected from No. 5. By this time the water is passing through the marc without taste and almost colourless, the marc itself being tasteless. To the 16½ ozs. I add 3½ oz. s.v.r. A precipitate is immediately thrown down, and this deposit goes on increasing for some days. Of this solid matter I take no notice, as I find that upon dilution, and on the addition of only a small quantity of ammonia, a very elegant mixture is produced. The saponin which appears to be present in such large quantities is not noticeable when the concentrated infusion is simply diluted without any added drug.

I have three samples here which will best show the slight difference between fresh and concentrated, and to further prove my case as to the value of an infusion made in this way being equal to and almost identical with one made by the official process, I took 100 c.c. each of fresh infusion, fresh decoction, infusion from this process and infusion from a bought preparation, evaporating all to dryness and with the following results:—

No. 1	=	solid extract, grams	1·09
No. 2	=	,, ,,	·79
No. 3	=	,, ,,	1·23
No. 4	=	,, ,,	·645

With these results I am very well satisfied, as they tend to show the advantage of cold water. No. 4 was received into stock bright. I presume it must have been poured off or filtered. Hence the low percentage.

The dried marcs from 1, 2 and 3 were treated with spirit in the B.P. tincture proportions. The small tinctures were pressed off, filtered, and small quantities evaporated to dryness.

The tinctures were almost without taste or colour, and the residues very small.

100 minims of fresh inf. marc = ·03
100 ,, ,, dec. ,, = ·025
100 ,, conc. inf. ,, = ·045

The fresh infusion marc and decoction residues were very resinous. The concentrated infusion marc yielded a residue less resinous.

From the dried extracts of the 1st, 2nd and 3rd infusions I prepared a powder on the lines of the abstracts of the United States Pharmacopœia. The strength is 3 root = 1 powder. It may be of service where it is desired to give senega in powder form. It seems to be satisfactory in aroma and taste. When made on a large scale this powder could be made more cheaply from the tincture.

I think now that concentrated infusions are so much used it is time they had some official recognition either in the B.P. or B.P.C. formulary, so that chemists who wish to make their own preparations could have some definite lines to work on, instead of each operator using his own process and with such different results.

A discussion ensued, in which Messrs. A. C. Abraham, M. Conroy, Dr. Symes and J. Bain took part, and a vote of thanks, proposed by Mr. Conroy and seconded by Dr. Symes, was unanimously accorded to Mr. Buck for his communication.

Mr. A. C. Abraham then read some "Notes upon some of the papers read at the recent meeting of the Pharmaceutical Conference," in which he confirmed Mr. Proctor's results respecting tincture of senna, and defended the B. P. test for pepsine, which he considered by far the best yet suggested, leaving but little to be desired for practical purposes. He mentioned in illustration of the solubility of glass that the ground necks of both English and German bottles would sometimes colour solution of phenol-phthalein, and shortly alluded to several other papers, and among others to Mr. Proctor's upon "A Scale of Small Residues," urging that some guide either of that nature or possibly a colorimetric one should be given in the Pharmacopœia, as a means of determining when exhaustion was sufficiently complete.

A discussion followed, and a vote of thanks proposed by Mr. M. Conroy, and seconded by Dr. Symes, was unanimously accorded to Mr. Abraham for his paper.

Dr. Symes, in seconding the vote of thanks to Mr. A. C. Abraham, said the paper was an exceedingly useful one, as it directed attention to points of interest. For some years before the publication of the last Pharmacopœia he had used a temperature of 120° F., for comparative experiments on pepsines, because the process was considerably shortened thereby. He thought that was a safer temperature than the one adopted by the Pharmacopœia, as if by accident the temperature rose much over the 130° therein recommended, the pepsine was spoiled; in other respects the official test was a good one.

The President now read his valedictory address—

Valedictory Address.

BY A. H. SAMUEL, F.C.S.

In terminating my period of presidentship of this Association, at this, the last meeting of the Session, I take this opportunity of expressing to the members generally, my thanks for the support so heartily accorded to me during my term of office. A retrospective glance at the work accomplished by the Association during that period will, I venture to say, show that in point of new and original matter it will favourably compare with any similar period since our Association was established.

On the amalgamation of the Liverpool Registered Chemists' Trade Association with us, fears were expressed in some quarters that the papers and communications of the Association might suffer in point of scientific interest, and that the original objects of the Association, namely the advancement of chemistry and pharmacy, might possibly be prejudiced by the admixture of questions of purely trade interest. I think the work of the past two sessions has shown that these fears have proved quite groundless, and that there have been as valuable technical papers read before us and as interesting discussions thereon as during previous sessions. We have adopted that admirable motto that in union there is strength.

Great changes have taken place in the calling of a chemist and druggist during the past quarter of a century. The force of competition has compelled all chemists who desire success to keep themselves fully *au courant* with all trade questions affecting them, as well as those of a scientific character.

They have not only to acquaint themselves with the most recent remedies and their nature and applications, but they have to carefully watch day by day that their trade interests are not unjustly encroached upon.

The increased stability given to our Association since the amalgamation has proved that the extension of its objects to the furtherance of the trade interests of its members has been a most wise and judicious step. The Curriculum Bill; the desirability of regulations for the keeping of poisons and of adding carbolic acid to the schedule of poisons; the proposed amendment to the Pharmacy Act, 1868, in reference to unqualified assistants in branch shops; the question of the proposed railway rates as to carriage on drugs, chemicals and empty packages; the question of licences for the sale of medicated wines: all these questions of trade interest have been dealt with, and the members' views expressed being published in the trade journals, have exercised their due share of influence in conjunction with those of other kindred associations throughout the country.

It would be out of place, in these few valedictory remarks, that I should refer in further detail to the papers of the past session. These will doubtless be fully commented upon by the able and accomplished pharmacist who succeeds me in this chair; but I would just like to say one word in regard to our annual Society gatherings which have latterly proved so increasingly successful.

The vocation of a chemist necessitates close application to business at those hours when the rest of his friends are usually enjoying periods of recreation and amusement. The Liverpool chemists' yearly social gathering began very modestly some years ago with an annual supper. It increased in numbers year by year, and has during the past two years developed into a public dinner of considerable dimensions, strongly and heartily supported by most of those connected with pharmacy in this city.

I trust that such gatherings may continue, and, if possible, be further increased, as they have for their only object the interchange of good fellowship. It only remains for me now to bid you adieu, and trust that the new year may in every way enhance the prospects of our Association.

Dr. Symes, in moving a vote of thanks to the President for his address, said he wished also to include the thanks of the Association for the able manner in which he had filled the office for the past two years. Although not actively engaged either in chemistry or pharmacy, Mr. Samuel had given considerable attention to the requirements of the office and to every detail of their work.

Mr. A. C. Abraham said he had much pleasure in seconding the vote of thanks, which was supported by Mr. Conroy, and carried with acclamation.

The meeting then terminated.

MANCHESTER PHARMACEUTICAL ASSOCIATION.

The ordinary monthly meeting of this Association was held in the rooms of the Chemical Club, Victoria Hotel, December 11, Mr. W. Wilkinson, Vice-President, in the chair. There was a large attendance.

The proceedings opened with the following paper on—

Our Association and its Future Programme.

BY H. KEMP.

There is, I think, no need for me to apologize for having pushed myself forward and volunteered to introduce this subject to-night. It is one upon which I have long held advanced (perhaps some would say radical) views, and after waiting long in the hope that someone better fitted would open up the question, I finally decided to break the ice and give all a chance in the swimming.

I take a great interest in this Association; I feel convinced that it is not what it ought to be, that is, a Society representative in any degree of the legitimate drug trade in this populous district.

Other trades and professions have their organizations in our midst exerting a power—good or bad: there are a Medical Society, a Legal Society, a Society of Professional Musicians, besides a great many more congregations of professional gentlemen. The grocers, the butchers, the bakers, and even the barbers, have their trade associations, and their influence is seen and felt; and the fact of these, or most of them, being active—not merely existing—bodies makes me wish to see ours in a more flourishing condition, more thoroughly representative, and exerting an influence which shall be felt throughout the trade of which the chemists and druggists in and around Manchester form no small part. It is therefore with a view to this end that I have asked you to come this evening and join with me in discussing the best methods of bringing about this much-desired end—of promoting good fellowship among our brother pharmacists, securing a large accession to our ranks and arousing an interest in the doings of the Association generally. I wish, if possible, to elicit some expression of opinion as to the best lines of conducting it in the future.

This, then, being my main object, I shall not trouble you with much of our past history, but will refer briefly to it for the purpose of showing what the Association was in its earliest years, to contrast it with the Association as it is, and then perhaps we may be able to gather from it something which will enable us to predict what the Association may be, or is likely to be, in the future.

When the Pharmacy Act of 1868 became law the leading spirits of the trade in Manchester—in common with those of other large centres such as Liverpool, Birmingham and Sheffield—thought it only right that a society should be formed to look after the trade's interests and promote measures for the education of rising pharmacists. By pharmacists, gentlemen, you will understand me to use the term in its broadest and most rational sense, *i.e.*, all engaged in the science or practice of pharmacy.

Well, a preliminary meeting was called, and the Manchester Chemists and Druggists' Association was launched into existence with much *éclat* and promises of a glorious career, for I believe it included amongst its first subscribing members nearly the whole of the light and leading of local pharmacy.

Apart from its labours in the direction of education, which do not now concern us, the Association met monthly or at more frequent intervals throughout the winter months (sometimes in the evening and sometimes in the afternoon) and discussed matters with more or less bearing upon pharmaceutical science. And at the evening meetings the members generally prefaced their business with a discussion of the exhilarating and tonic properties of "the cup that cheers, but not inebriates."

Once during the session our grave and reverend seigneurs did unbend; *pro tempore*, they put aside the serious solemn half of their visages and dined together, afterwards cracking jokes and making merry till far on towards midnight. Gradually change, and shall I say "decay," began to show itself. Year by year its members grew less, interest in its proceedings seemed to wane, and after a few years this Manchester Chemists and Druggists' Association, which meanwhile had changed its title to that of the Manchester Pharmaceutical Association, had almost ceased to exist.

All honour to the men, I say, who at this time remained true to their trust; who stood round the smouldering ashes and by their loyal devotion to pharmacy managed to keep a spark alive till more workers were brought in and helped to fan the few glowing embers once more into a flame.

I pass now to the year 1886. The anticipated visit of the British Pharmaceutical Conference to our city in the year of our Queen's Jubilee roused the fraternity to take a particularly pleasing interest in matters pharmaceutical. The chemists, almost to a man—at least I should say, the more intelligent of them—were suddenly roused to enthusiasm, each vieing with another to do his best to make the coming visit a grand, a memorable success. They had at last found a common source of pleasure, an event was about to happen in which they could all take an interesting part, and they met together in good sensible numbers to propound and discuss plans for the entertainment of their visitors, and of themselves too, for did it not prove as great a pleasure to the entertainers as to the entertained?

Well, gentlemen, it was this Association which took the initiative in collecting the forces on that occasion. If somewhat dormant, it needed but the stimulus to waken into life and vigour once again; the machinery existed, and the workers consequently found everything ready for organizing and carrying out their schemes.

The Conference came and went, and with its departure the great mass of interest exhibited by local chemists in their brethren of the pestle seemed to subside, and our Association once more became what it now is, a small band of subscribing members within whose narrow limits may be found a still smaller band of active members anxiously working to maintain vitality; whilst others outside are waiting for some fresh startling event to turn up which shall bring excitement into the ranks of the trade generally, assailing their trade interests and causing them to seek safety in combination. To wait until a panic stirs their fears before throwing in their lot with us is not a noble spirit, and I could wish, nay, I *do* heartily wish that an increasingly large number of them would see the wisdom of giving us the benefit of their counsel now, instead of waiting till self interest prompts their action.

We have seen what our Association was, we know what it is, and now, gentlemen, let us turn to the main question which concerns us, and see if we can agree about its immediate future. "What it may be" and "what it will be" are not necessarily one and the same thing. It does not require the wisdom of a Solomon to know that "it will be" what its members make it, but we have to consider what "it may be," and the best methods of making it what it ought to be.

And, before expressing any opinions of my own upon its futurity, I would draw your attention to our second rule, as lately revised.

You will note that no mention is made of education; we need not now concern ourselves about the education question. Private schools and public colleges in our midst are more than sufficient to meet the necessities

of young pharmacists; and are able, moreover, to maintain themselves without either our patronage or interference. Consequently, we find the fundamental bases of our Society are "the promotion of pharmacy," and "the protection of legitimate trade interests." Here are the purposes for which we are associated. To bring about, to further these laudable objects, there must first exist good fellowship, good feeling among the members of the trade, and how best to bring about this good fellowship is what, I think, you will have to consider and decide.

Perhaps the necessity for a local pharmaceutical association is not admitted; but I think when you consider how we are badgered about between stupid excise regulations on the one side, new and previously unthought of readings of old Acts of Parliament on another, illegitimate and illegal opposition on another, tossed about like a straw by cruel winds, first this way and then that, you must see the necessity for combination, you must see how, in a great measure, this unsatisfactory state is the result of a want of unity. We are as the shingle of the sea-shore, moved by every ebb and flow; were we united in a bond of unity—fraternity—we should be more like that shingle when cemented into conglomerate blocks of concrete, capable of offering resistance and maintaining our rightful position.

This may be but dreaming, yet I think you all acknowledge the truth and force of the old adage, "union is strength," and it demonstrates, to my mind, the necessity for the existence of our Association—vigorous and active.

And here I would temporarily diverge from my path to point out one application of my argument. If half the chemists and druggists of this district were members of this Association, and they could discuss and agree upon a policy, they are sufficient in numbers to very materially affect the result of an election to the Pharmaceutical Council, and to exert a distinct influence upon the policy of that body. There would be much more sense in such a proceeding than in the silly cry of those who are constantly grunting, grumbling and bewailing the sad condition of our lot, yet never by word or act do anything to alter affairs. Instead of this, however, our apathy has left us without representation. The gentleman who sat upon that Council to take care of the interests of pharmacy in this immense district was allowed to retire, without a single finger being stirred to prevent him or appoint a successor until too late. Practically we allowed ourselves to be disfranchized.

Apologizing for this digression and turning again to the discussion of "our future," this Association, as I said before, will be whatever the members make it, and to those of you who are present I put the question What do you wish to make it? Are you satisfied with its present condition? If not what are you doing or what are you willing to do to alter it?

In conversations with some usual absentees and with some outsiders, I have been much concerned with the reasons offered for a want of interest in our Society. One (and this a gentleman for whom I have the greatest respect) says, "I prefer to read science at home, the *trade* want matters of *trade* interest." Another, "You should make your meeting more social, less formal in character." Another asks me, "What good will it do me to join?" This gentleman evidently looks to receive value for money, but to such my answer is, "See how much good you may do others." Yet another says—worse than all—"I do not care to bow to a clique." Gentleman, this last contains an insinuation as unkind as it is untrue, and I only mention it here to refute it. No member of this Society has more power or weight than another, if other members like to exercise theirs. It is "one man one vote;" *but* (and here's the rub) if one man takes an interest in the Association, and by his voice and vote influences its proceedings, he is more than equal to a dozen who never use one or other of their privileges.

To those who desire more matters of trade interest I say, "Introduce them! or if you feel incompetent or are deficient in confidence, suggest them to others." By all means let us have trade subjects, as often as you please, and as many as we can get, but we can scarcely expect some dozen or so members to do all the work. Share it! and the honours too.

To those who wish the social elements developing more I say, "I am with you," but we must not fall into the error of thinking that we exist solely for levity and conviviality. There are times, however, when we might relax a little—a good player is often the best worker—and without losing our dignity we might sometimes fraternize and frivol, even as our predecessors did. Besides, does not our parent Society have its dinner and its annual ball? Do not the sedate members of the British Pharmaceutical Conference induct with a conversazione and soiree, and when their more serious work is over do they not turn with boyish enjoyment to the variety entertainment of the smoking concert? Why then should not we have our dinner, our soiree, our cinderella, and our smoking concert? Who will say, after our recent experiences of the last-mentioned form of frivolity, that any of us are the worse for it, either as pharmacists or citizens?

By these means we may perhaps attract additional members to our ranks, and in these social gatherings may learn to know one another better, and in fraternity and freedom of intercourse bury our petty jealousies, remove misunderstandings, and find in our fellows some good qualities we never gave them credit for possessing.

I have heard it asserted that chemists are a short-sighted, narrow-minded set of men, and that it is owing to the constricted character of their mental and visual faculties that they succeed so well in misunderstanding one another. Sometimes one hears it said of a brother, "He cannot see further ahead than the end of his nose." "He takes an interest in nothing beyond his till and himself." And the speaker then raises himself upon an imaginary eminence of superiority, and we can imagine we hear him ejaculating his thanks that he is not as these men are, reminding one very much of a well-known character mentioned in ancient history. But seriously, gentlemen, though there may be narrowminded and shortsighted members of our fraternity,—and over-conceited ones, too,—I think the average chemist is a man of more than average intelligence, and the large number of chemists who occupy positions of honour in the public service testify that their intelligence, at least, is appreciated. It is possible that many in these days do keep their noses so close to the grindstone, and keep them there so long, that their penetrative power is considerably blunted, but I am not sure that this applies any more to chemists than to other classes of tradesmen or professional gentlemen. Perhaps, however, the nature of our calling, requiring as it does a concentration of brain power upon minute quantities of things, and carrying with it, as I fear it often does, the contemplation of minute quantities of reward in the form of "cash received," perhaps the nature of our calling does tend somewhat to diminish our power for participating in or even appreciating anything beyond what is little; but ought we not to try and induce one another to come out from our narrow spheres—from our little worlds—awhile and occasionally? Perchance we may prevent, or at least, postpone the dulling of our brighter intelligence, and, by promoting in this way the well-being of the pharmacist, it may ultimately lead to the "promotion of pharmacy."

Come to our meetings, and if you hold views on one or other of these questions give them expression, then if you are supported by a majority you will make

the Association just as you want it, whilst the minority will loyally give way and fall in with and assist you to carry out your proposals. On the other hand, if you should find yourself in a minority, do not set your back up and go away in a huff, but submit with good grace to what may be the better judgment of your fellow members, waiting your opportunity to again air your opinions.

Gentlemen, I have said a great deal more than I at first intended, and some of you will perhaps think I ought to have taken a text (I am sure my remarks must have sounded very sermonizing), but my apology must be that I feel deeply concerned about this "stand-offishness" of the trade generally and am anxious that, with the view to its removal, opinions should be freely expressed as to the lines upon which it is most desirable to form our future programme.

Mr. W. Elborne, Mr. W. Lane, Mr. Botham, Mr. J. Wheeldon, Mr. Pratt, Mr. Wild, Mr. Smith and others joined in the discussion which followed.

NOTTINGHAM AND NOTTS CHEMISTS' ASSOCIATION.

The annual dinner in connection with this Association was held at the Masonic Hall, the President, Mr. Councillor R. Fitzhugh, J.P., in the chair. There was a good attendance.

Mr. J. S. Radford proposed the toast of "Continued Success to the Pharmaceutical Society," coupling with it the name of Mr. W. H. Parker (Local Secretary), who made a few well-chosen remarks in response. He alluded in terms of regret to the apparent indifference which the Society looked upon matters which were to the advantage of its members and the trade generally.

Dr. C. Haydon White, who was cordially received, proposed the "Nottingham and Notts Chemists' Association." He explained that its object was to promote the education of their apprentices, and that unless they had such facilities as this Association afforded, their chances of success in examinations were not so good. He also referred to the excellent working of the Association by its officers and Council, and the success which had attended their efforts. The names of Councillor Fitzhugh, Mr. J. Wilford (Treasurer), and Mr. William Widdowson (Hon. Sec.), were coupled with the toast.

Mr. Fitzhugh observed that the Association generally was in a satisfactory condition; he had always desired to advance the interests of chemists, and this in one way might be done by attending to the wants of the younger members. He had been President for many years, during which time the Association had helped to qualify many students for the profession. He had a most harmonious Committee to work with, and whilst they had such a Committee and officers he was quite sure the Association would continue to flourish.

Mr. Wilford, in responding, endorsed the remarks of the Chairman.

Mr. William Widdowson also responded, thanking Dr. White for the able manner in which he had proposed the toast of the evening. He also alluded to the social aspect of the Association, observing that the members had their annual picnic in the summer and the dinner in winter, both of which were always enjoyable.

Mr. C. A. Bolton, in proposing "The Professor and Teachers of the Classes," alluded to the advantages derived from the valuable classes held in connection with the University College. He had seen students from these classes make their way in the world, and one of his late apprentices was now assistant analyst for Birmingham. He felt sure all would use their endeavours to place those classes within reach of their apprentices and assistants. In coupling the name of Professor Clowes with the toast, he spoke of the earnest work of that gentleman in connection with their Association. He also made similar remarks respecting Dr. White.

Professor Clowes, in responding, was most cordially received. He thanked Mr. Bolton and those present for their kind reception, alluding also to the generosity of Dr. White in undertaking a class on Materia Medica, in spite of the increasing demands made upon his time by his own private practice.

Dr. White also responded, observing that it would perhaps be years before outsiders would realize the benefits accruing to students at the College. He also spoke in praise of those who attended his lectures, adding that by their regular attendance and diligence it enhanced the pleasure of his work.

Mr. Parker, of Liverpool, proposed "The Town and Trade of Nottingham," Councillor J. Lees responding.

"The Visitors" was next proposed by the President, and responded to by Councillor F. Farrands.

The health of the Chairman was also toasted with musical honours, and suitably responded to.

NEWCASTLE-ON-TYNE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fifth fortnightly meeting of this Association was held on Wednesday evening in the Mosley St. Café, Mr. J. Pike, President, in the chair.

The minutes of the previous meeting were read by the Assistant Secretary (Mr. M. Bell) in the absence of the indefatigable Secretary (Mr. S. F. Merson), who was confined to his room through illness. The minutes having been adopted, the President called upon Mr. F. Park, Vice-President, to read his paper on "Fermentation," at the close of which specimens of yeast, etc., were shown under the microscope.

The address, which was very interesting, was listened to very attentively by the members. Mr. J. Pike proposed and Mr. D. H. Oxen seconded a hearty vote of thanks to Mr. Park for his able paper.

This was carried unanimously.

A moot question in dispensing was raised by one of the members (Mr. M. Bell) which elicited an amount of interesting discussion.

The usual vote of thanks brought the meeting to a close.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The first students' night of the present session was held on Wednesday, December 11, the President, Mr. A. W. Fox, occupied the chair.

The Honorary Secretary, having read the minutes of the last meeting, three members and ten associates were elected.

The following papers were then read by students in the Society's school: "Botanical Rambles Around Sheffield," by Mr. J. Austen; and "Pills and their Excipients," Mr. A. S. Smith. The papers will be published in a future number.

After the reading of the papers a discussion ensued, in which Messrs. Grierson, Learoyd, Morrison, and Twelves took part. A vote of thanks to the essayists brought the proceedings to a close.

EDINBURGH CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of the twelfth session was held in the Pharmaceutical Society's House, 36, York Place, on Wednesday, December 11, at 9·15 p.m., Mr. Donald McEwan, Vice-President, in the chair.

The minutes of last meeting having been read and approved, the following communication was read:—

Extractum Cascaræ Sagradæ Liquidum.

BY JOHN FINDLAY.

For the preparation of liquid extract of cascara sagrada very vague directions are laid down in the Pharmacopœia. It directs the bark to be boiled with three or four successive quantities of water, but makes no mention of the quantity necessary, whether pints or gallons. From experiments made I would suggest that the official directions should read thus:—

"Boil the bark in six pints of the water for half an hour. Strain off the liquor and repeat the operation until the bark is exhausted, using four pints of water each time. Mix the strained liquids and evaporate by a water-bath to 12 fluid ounces; when cold add the spirit, allow the mixture to stand for twenty-four hours, filter, and make up the volume of 16 fluid ounces with distilled water."

The official process is, however, not very satisfactory. After the spirit is added a large quantity of mucilaginous matter is precipitated which renders filtration a rather tedious and difficult operation. And even when this has been accomplished there is a further deposit after the preparation has stood for a few days. I have prepared a sample according to this method, and the following are the details of the operation. Each of the liquors was kept separate, allowed to cool, the requisite proportion of spirit added, and after standing, filtered. I then took the specific gravity and amount of dry extractive of each. The following are the results:—

	Specific gravity.	Extractive per cent.
1st straining	1·016	4·1
2nd ,,	1·010	3·4
3rd ,,	1·004	3·1
4th ,,	1·002	0·9
Finished product	1·062	26·

It is considered by some that by the action of heat and air the active ingredients are more or less altered, and by the evaporation necessary the original flavour is dissipated so that the preparation does not fully represent the drug. It is also said that there is a ferment in cascara sagrada which causes griping, and that when heat is used this ferment is destroyed and the griping obviated. I have found, from experiment, that it is quite impossible to exhaust the bark with a quantity of water which does not require evaporation, and the ferment which causes griping may be got rid of by keeping the bark for one year before it is used.

As I have already said the official process is not satisfactory. I have tried various ways in order to find a better, and the following are my results:—

The first I tried was as follows:—

Take of—

Cascara sagrada, in coarse powder	1 pound.
Rectified spirit	4 fluid ozs.
Distilled water	a sufficiency.

Macerate the bark in 30 ounces of water for forty-eight hours, transfer to a percolator, and continue the percolation with more water until the bark is exhausted, reserving the first eight ounces. Evaporate the remainder to 4 ounces, allow to cool, and add the reserved portion together with 4 ounces of spirit. After standing for twenty-four hours filter if necessary, and make up to 16 fluid ounces with distilled water. The finished product has a specific gravity of 1·061, and yields 25 per cent. of dry extractive.

The next method I tried was the following:—

Macerate the bark in a mixture of 4 fluid ounces of rectified spirit, and 12 fluid ounces of distilled water for 48 hours. Transfer to a percolator, and continue percolation with distilled water until the bark is exhausted, reserving the first 10 ounces. Evaporate the remainder to 5 fluid ounces, allow to cool and add the reserved portion and 1 fluid ounce of rectified spirit. After standing for twenty-four hours filter, if necessary, and make up to 16 fluid ounces with distilled water. The product has a specific gravity of 1·100, and yields 30 per cent. of dry extractive.

I have also tried the following formula, which is American, but, as can be seen at a glance, the quantity of spirit is excessive. The bark is, however, very thoroughly exhausted:—

Take of

Rhamnus Purshianus bark	1 pound
Alcohol	6½ ozs.
Water	3½ ozs.

Percolate with mixed menstruum until 10 ounces have passed. Reserve this portion and continue the percolation until exhausted. Evaporate to 4 ounces and add 1 ounce of spirit. The specific gravity of this preparation is 1·050 and yields 30 per cent. of dry extractive.

With regard to the physiological action of these preparations, the one prepared by macerating with the mixture of 4 ounces of spirit and 12 ounces of water was found to be the most active. Ten drops taken before breakfast had a decided effect on a person suffering from habitual constipation, and twenty-five drops acted as a powerful laxative. The one prepared by percolation with water alone is also very active, in fact almost as much so as the preceding. From this we may infer that although resins have been found to be the active principles in cascara sagrada there must be something else possessing laxative effects, as we know that resins are insoluble in water.

I have experimented with a view to construct a formula for tasteless extract of cascara sagrada, but without a satisfactory result. I have here, however, a sample made in a retail establishment and I think it is as good an example of this preparation as can be found in the market. It is prepared, I believe, by adding a small proportion of liquor potassæ to the ordinary commercial fluid extract and sweetening and flavouring to taste.

As I think retailers ought to be encouraged in the preparation of such articles I would recommend it to those who are in the habit of purchasing their tasteless fluid extract of cascara.

While working with cascara it occurred to me that I might be able to separate some of the resins to which the bark is said to owe its activity. In none of the literature I have seen is there any mention of how these may be prepared. Following the eclectic process I made a rectified tincture of cascara (1-in-8) evaporated to one-tenth of its volume, and poured it in a gentle stream into water acidulated with hydrochloric acid. By this means a substance was precipitated which acts as a laxative in doses of 6 grains. It is evidently a resin.

I next prepared a proof spirit tincture, and proceeding in the same way obtained a resin, but not in such large quantity, though evidently more active. I therefore concluded that some inert body was extracted by the rectified spirit and not by the proof, so that the first resin is a mixture of two.

I then percolated the marc from the rectified tincture with boiling alcohol and on concentrating and precipitating as before a whitish brown resin separated. Just when I had got so far with my experiments I found that an American gentleman had been working at the same subject and had prepared his resins in a similar manner. I have samples of the resins here, but as I have been anticipated I need not pursue the subject further.

———

An interesting discussion followed, during which it was stated than an elegant and active fluid extract could be prepared by using water alone, and also that the fact that water exhausted the bark did not prove that

the active constituent was not a resin, as the resins might be combined with ammonia which had been found in the bark by Park, Davies and Co.

The discussion was taken part in by Messrs. Arthur, Coull, Dougall, Duncan, Hill, Lothian, Lunan, McEwan, and Macpherson.

The next communication was on—

Seidlitz Powders.

BY J. H. HOSEASON.

My objects in bringing this subject under your notice are to point out the great differences which exist in the composition of ordinary commercial samples, and to suggest some means of overcoming this fault. The only feasible plan to obtain uniformity, I think, is the introduction of a formula for their preparation into the Pharmacopœia. It will seem surprising to many, I have no doubt, that the present Pharmacopœia does not contain such information, since it is no unusual thing for the editors of that work to introduce formula imitating some of the more popular patent medicines such as chlorodyne or fluid magnesia. That we should have a recognized formula is obviously desirable, since doctors very often order these powders by prescription. It will be seen by a perusal of the tabular statement which I have drawn up, that a patient ordered to use them would seldom or never get two powders alike.

Sample.	Strength.	Contents of blue paper.	Contents of white paper.
1.	Single	82·5 grains	37 grains.
2.	„	101·0 „	25·5 „
3.	„	152·0 „	52·5 „
4.	„	156·0 „	35·5 „
5.	Medium	163·5 „	46·5 „
6.	Double	286·0 „	115·0 „
7.	„	318·5 „	41·0 „
8.	„	299·0 „	46·0 „

The average weight of the single size was blue paper contents 122·8 grains, and white paper contents 37·8 grains. In the double size blue paper contained an average of 301·1 grains, and white 67·3 grains. It is evident that a doctor prescribing such powders would never know definitely what his patient had been supplied with, and this is very undesirable.

Not only does the weight of the powder vary, but I hope to be able to show you from the results of a few analyses of samples obtained in the usual way that the seidlitz salt itself also varies to a considerable extent and that a uniform seidlitz salt is at present non-existent. Attfield and Squire both give formulæ corresponding to 75 per cent. of tartarated soda and 25 per cent. of sodium bicarbonate, and wholesale houses seem to follow this formula more or less, though it is different, apparently, with retail chemists.

The method of analysis which was found to yield the most satisfactory results by experiments on mixtures of tartarated soda and sodium bicarbonate, and on mixtures of these two with sugar was the following:—

Mix the sample in a mortar to ensure uniformity, as in some cases equal measures of rochelle salts and seidlitz salts are merely thrown together and wrapped up to form the contents of the double sized powder. Weigh 50 grains, dissolve by gentle heat in 1 ounce distilled water, titrate with standard oxalic acid, using litmus as indicator. This indicates the quantity of sodium bicarbonate in 50 grains. To another 50 grains dissolved in as little warm water as possible add acetic acid, in small quantities, to excess. Effervescence having ceased, boil, redissolving the precipitate which has formed; then pour into cold methylated alcohol, allow to cool, stir, filter through a tared filter paper, wash with methylated alcohol, dry and weigh the precipitate. From the weight of this precipitated cream of tartar, of which 188 grains correspond to 282 grains of rochelle salts, the quantity of the latter in the 50 grains of seidlitz salts can be readily found. Sugar was calculated by difference. The percentage composition is found by doubling the results. Sugar does not interfere with the precipitation of the acid tartrate of potassium in such a mixture to any appreciable extent, if at all.

Another method of estimation found to give good results and entirely volumetric was the following. Estimate the sodium bicarbonate present in a given weight of seidlitz salts by standard oxalic acid, using litmus as indicator. Ignite a known weight of seidlitz salts at a low red heat for fifteen minutes, dissolve out the alkaline carbonates by lixiviation with boiling water, filter and estimate the total quantity of carbonate by titration with standard oxalic acid, using litmus as indicator; deduct a quantity of sodium carbonate equivalent to the quantity of sodium bicarbonate already found from the total sodium carbonate and calculate the remainder into rochelle salts. Sugar when present was calculated by difference. Eight seidlitz powders and two seidlitz salts were examined with the following results:—

Sample.	$KNaC_4H_4O_6$ per cent.	$NaHCO_3$ per cent.	Sugar per cent.
1	55·0	25·0	20·0
2	47·5	52·5	——
3	37·5	30·5	32·0
4	79·0	27·5	——
5	76·5	13·0	10·5
6	72·0	28·0	——
7	77·5	12·5	10·
8	70·0	15·0	15·
9	74·0	26·0	——
10	76·0	24 0	——
Average	66·5	25·4	——

The numbers on this table correspond with those on the previous one. Fifty per cent. of the powders examined contained sugar, and in each case where sugar was present oil of lemons was used as a flavouring agent. No. 4 contained less water of crystallization in its rochelle salts than is required by the molecular weight of the official salt which was taken as standard. It therefore adds up a little over the hundred.

The very natural question now arises, what should a seidlitz powder contain? Should it be sweetened and flavoured or should it not? The majority of the public seem to prefer one so sweetened and flavoured.

It has, however, the disadvantage of caking. I do not think this will spoil it in any way except in appearance. An official seidlitz powder should be based on the type of the present small size and should contain neither sugar nor flavouring.

Saccharin would make an ideal sweetener for seidlitz powders, being in an alkaline medium. Care would need to be taken to allow of sufficient alkali being left after neutralization to keep the saccharin in solution and give it full scope for its sweetening powers.

In the event of our having an official formula what would be the best technical name to adopt? Should we follow the United States Pharmacopœia and call them "Pulveres Effervescentes Aperientes," or should they be called "Pulveres Sodæ Tartaratæ Effervescentes." I think the latter name is best, as it gives an idea of the composition of the powders.

The wrapping and general put up of these articles require criticism. Some were exceptionally neat, but I am sorry to say others were very slovenly. Those wrapped in machine-cut paper looked far and away better than those in hand-cut, or rather, I should say, hand-torn paper

In the *Pharmaceutical Journal* for the 7th inst. it is announced that the General Medical Council intend publishing an addendum to the present Pharmacopœia next year, and since suggestions regarding articles

deemed worthy of insertion are invited, I would propose that the following formula should be adopted:—

Tartarated soda. . . . . 120 grains.
Sodium bicarbonate . . . . . 40 ,,

Mix and wrap in a blue-coloured paper.

Powdered tartaric acid . . . . 40 grains.

Wrap in a white paper.

I would further suggest that tests for purity, and a process for purity and a process for estimation should also be inserted. I hope I have been able to show that an official formula would be an advantage to all parties concerned, viz., patient, doctor and compounder.

The reading of the paper was followed by a discussion taken part in by Messrs. Bell, Coull, Duncan, Findlay, Hill, Lunan, McEwan and Rawlinson, and on the motion of the Chairman, cordial votes of thanks were awarded to the authors of both papers.

The meeting then closed.

The Annual Conversazione.

The sixth annual Conversazione took place in the large hall of the Literary Institute, South Clerk Street, on the evening of Friday, December 13, at 8.30.

Mr. A. Russell Bennet occupied the chair, and there was a very large attendance, among others present being Mr. William Gilmour, Chairman of the Executive of the North British Branch, Mr. J. B. Stephenson, Chairman of the Board of Examiners for Scotland, Mr. D. McEwan, Vice-President, Mr. Wm. Aitken, Mr. W. L. Howie, Mr. D. Maclaren, Mr. W. Smith and Mr. Thomas Thompson.

The Chairman intimated apologies from Messrs. William Ainslie, D. Storrar, Vice-Chairman of the Executive of the North British Branch, and Provost Watt, Haddington.

The first two hours were most agreeably spent in listening to an excellent and well rendered programme of songs, recitations and instrumental pieces contributed by Misses Macdonald, Gordon and Wright and Messrs. Davidson, Dow, Duncan, Hartley, Hogg, Lunn, Ruthven, Thompson, Waterstone, and Whyte, Mr. J. Ewart acting as accompanist.

On the motion of the Chairman a hearty vote of thanks was awarded to the contributors, and on the motion of Mr. Gilmour, a similar vote of thanks was awarded to the Chairman.

Under the management of Messrs. R. Butchart and J. H. Hoseason a dance programme, taken part in by about eighty couples, was then proceeded with and kept up with great spirit till 4.30 a.m.

The platform was very tastefully decorated with plants kindly lent by Mr. James Buchanan and Messrs. Bailden and Son, Duncan, Flockhart and Co., Mackay and Co., Macfarlan and Co., Jas. Robertson and Co., and T. and H. Smith and Co. sent an ample supply of aerated waters.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The tenth meeting of the first session was held in the Association's Rooms, 74, Commercial Street, on Thursday evening, December 5. The President, Mr. John Forsyth, in the chair. There was a good attendance, and the appearance of the room was greatly enhanced by the presence of herbarium specimens hung on the walls and specimens and microscopes on the table.

The Secretary read the minutes of the previous meeting and these were duly adopted; after which Mr. George Young was elected Assistant Secretary in place of Mr Adam, who has gone to fill a situation in Aberdeen. Some other matters of business having been attended to the Chairman called on Mr. William Mair to read his paper "Botany and its Relation to Pharmacy."

The author took as a suggestion for thought the following passage, written by the late Professor Edward Forbes:—"The classical and mathematical studies of our youth are not so much intended to teach us classics and mathematics, but to train us to the business of life and to right judgment in the higher pursuits of men."

He thought these words contained in a nutshell the ideal relation of the science of botany to the practice and profession of pharmacy; that is, not simply as a means to a very definite end, and that end our examinations, but as an important part of our equipment for actual service in the ranks of Pharmacy, and as an acquisition that will be useful to us throughout our whole pharmaceutical career. He hoped that some mutual practical benefit might result, and that some encouragement might be given, particularly among the younger members, but also among their more advanced members, to the study of the beautiful science they had met together to study that evening.

Taking, in the first place, the historical relation of botany to pharmacy, Mr. Mair stated that botany as a science had in a large measure originated through the wants of pharmacy. It was possible to trace from the earliest times a distinct relationship between all that might be called botany and all that might be dignified by the name of pharmacy in the application of the productions of the vegetable kingdom to the uses of mankind.

Thus it was common to find, even to-day, among the uncivilized tribes a sort of rough, general acquaintance with the wholesome and poisonous properties of the plants with which they are surrounded. Some of the earliest botanical writings (a few interesting extracts from which were quoted) showed that botany had always been in a large measure subservient to the needs of pharmacy.

With the advance of the science, botanical gardens were established, the first of these on record being that of Matthœus Sylvatium, established in 1309, a provision which has since become an indispensable adjunct of our medical schools, but which, now that pure medicine is becoming more and more dissociated from pure pharmacy, was coming to be recognized as a no less important association of schools of pharmacy. Meanwhile a class of herbalists had arisen, and a very striking contrast was given in a formula of about two hundred years ago for an aqua pectoralis, in which all the vegetable ingredients, to the number of about twenty, were to be "gotten green that can be," in comparison with the tendency of to-day towards the dispensing of valoids, equaloids and the like. Mr. Mair then went on to speak of the value of the science to the pharmacist, especially in these days, when the pharmaceutical pericranium is regarded as a sort of consummate encyclopœdia, when the pharmacist is expected to possess a general knowledge of all the properties, sources, etc., of the various organic and inorganic substances retailed by everyone of his commercial neighbours.

The importance of botany as a study was next referred to. The author wished to dispel, to some extent, the impression, a growing one unfortunately, that there is such an inseparable dryness connected with botany as a study, that it constitutes at once the most obnoxious and most-to-be-avoided subject of the pharmaceutical student's curriculum, compulsory or otherwise. He reminded them that every one of the varied organisms of their study must be regarded as a life, and that this, together with a true conception of the external form, was the true idea of the study of modern botany. A more general application to the physiological aspect of the study was advocated. He thought that it was a fault with a great majority of text-books, to which Bentley's was no exception, that this important aspect of the subject was inserted as an additional chapter at the end. He was confident that even

pharmaceutical students would find their introduction to, and subsequent study of, the science much more easy and interesting. They were encouraged to read the life history of the plants from the plants themselves. They had first however to learn the "alphabet," then the facility for reading was unlimited. For this purpose Bentley's work was recommended. Proceeding Mr. Mair referred to the want existing in Dundee of a botanical garden, and he hoped that with the assistance of the Medical School this want would be supplied. After a number of interesting details calculated to stimulate interest among the students, he proceeded to speak of the advantages and possibilities of botanical studies. He referred in glowing terms to the science of botany as a pleasurable study, a mental training and a healthful training, and to the incalculable profit intellectually which was derivable from it. There were many possibilities for ardent students in all departments of the science. Bacteriology as a branch practically of the science, the selection of adulterations by botanical and microscopical features, and the isolation of alkaloids were mentioned among others as directions in which botany had an important bearing on the profession of the pharmacist.

He advocated that greater attention should be paid on all hands to the prosecution of botanical study, and he was confident that this would produce better and more successful pharmacists, while the application of our knowledge to the business would be advantageously extended. In conclusion he quoted a passage which had been made use of by Professor Bentley in the course of a lecture which he delivered in Dundee as President of the British Pharmaceutical Conference in 1867, when, curiously enough, he chose as his subject, "Botany, and its relation to Pharmacy," although the author was not aware of this until several months after his subject was handed in.

On the conclusion of a very interesting paper Mr. Mair invited the members to examine several microscopes which he had arranged in connection with his paper, and also several samples of drugs, the botanical character of which he proceeded shortly to describe. He expressed his indebtedness to Professor D'Arcy Thompson, University College, Dundee, for the use of several microscopes, also to Messrs. Burroughs, Wellcome and Co., T. Christy, and to E. M. Holmes, J. Moss and Co. and the Editor of one of the trade journals for the specimens of drugs on the table, most of which were for presentation to the museum, and he had much pleasure in handing them over to the Association.

Some discussion thereafter took place on the paper, and, on the motion of Mr. Henderson, a hearty vote of thanks was accorded

On the motion of Mr. Lamont, seconded by Mr. Skinner, a vote of thanks was given to the various gentlemen who had presented specimens, and the Secretary was instructed to write and thank them for their respective gifts.

Mr. W. Gilmour, of Edinburgh, and a number of local chemists who had subscribed to the funds of the Association were afterwards elected honorary members.

A vote of thanks to the Chairman concluded the proceedings.

On Friday evening the 6th, the microscopic objects were again exhibited and a few interesting details were given as to the construction and use of the microscope.

The eleventh meeting of the session was held on Thursday evening, December 12, the Vice-President, Mr. Skinner, in the chair. The Secretary read the report of the Committee on the Apprentices' Prize competition, from which it appeared that the prizes had been awarded as follows:—1st prize, Mr. Charles T. Duncan; 2nd prize, Mr. Fred David; 3rd prize, Mr. James Fernie.

The remainder of the meeting was devoted to the reading of short papers on "Infusions," by Mr. Lindsay; "Pill Coating," by Mr. Hislop; and "Improved Formulæ for (*a*) Lotio Hydrargyri Nig., and (*b*) Lotio Plumbi c. Opio," by Mr. T. C. Henderson. These papers will be dealt with in a future number.

ABERDEEN CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

The fourth meeting of this Association was held in the Silver Street Hall on Friday evening, December 13, the President, Mr. Curtis, in the chair.

The minutes of the previous meeting having been read, and some business matters discussed, the President called on Mr. James Clark to read his paper upon "Volumetric Analysis."

Mr. Clark first compared volumetric with gravimetric analysis, showing the superiority of the former method over the latter in all cases where applicable. After exhibiting and describing the necessary apparatus, the volumetric solutions of the B.P. were mentioned and their preparation explained, samples of all being shown on the table. Several estimations were made to illustrate the various processes. Mr. Clark was of opinion that the burette was too little known, and contended that every chemist ought to be able to prove the genuineness of his preparations by volumetric analysis when so ordered in the B.P.

A vote of thanks having been accorded to Mr. Clark, the meeting terminated.

GLASGOW CHEMISTS AND DRUGGISTS' ASSISTANTS' ASSOCIATION.

This Association held its usual fortnightly meeting on Wednesday the 11th inst. The President presided. After approval of minutes Mr. Colvin Gates was called on to read his essay on "The Chemistry of Silver." He noticed the names under which the metal has been known in various countries and at different times; its history as gathered from references in Scripture, in classic authors and in more recent authorities; its geographical and geological sources; the various methods of extraction—as by amalgamation from its ores and crystallization from lead. The uses of silver, as a medium of exchange, in the manufacture of plate, jewellery, etc., were then touched on. The different salts of silver were considered in detail; note being taken of their chemical and physical characteristics, and of their uses in the laboratory and in the arts.

After a discussion, in which Messrs. Harley, Gilmour, McKellar, Fisher, Watson and others took part, Mr. Gates replied, and a vote of thanks was awarded to him on the motion of the President.

The Committee appointed at a previous meeting to endeavour to procure for the use of the Association the library, microscope, etc., belonging to the late Glasgow Chemists and Druggists' Association, reported the successful termination of their labours and received a vote of thanks.

A motion declaring the recent interpretation of the "Pharmacy Act, 1868," to be at variance with the intention of its framers, was carried against the previous question by a small majority.

Proceedings of Societies in London.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the above Association, on Thursday, the 28th ult., Mr. T. A. Ellwood, President, in the chair, the following papers were read:—

A Portable Botanical Press.

BY H. HELBING, F.C.S.,

Apotheker of the German Hospital, Dalston.

Although the season for collecting botanical specimens is over, I should like to draw your attention for future excursions to a herbarium press, much used in Germany, which is superior in many respects to those commonly used in this country.

As you see from the specimen I show you, this press consists of two separate iron frames, each about 16 inches by 10. Each frame is filled with a network of iron wire, with meshes about an inch square. Two catches jut out from each side of one frame, small brass chains being fixed at corresponding points on the other, so that the links can be slipped over the catch.

As soon as gathered, the fresh plants are laid on paper in the frames, and when the necessary quantity has been obtained, the frames are placed together with the plants between, and connected, the chains being pulled on to the teeth. Owing to the elasticity of the paper and plants a pressure is produced more than enough to keep the links of the chains on the teeth.

Such a press is cheap, can be made by any smith, is neat, always ready for use, occupies very little space, and having a handle, can be easily carried about, so that the plants can be prepared and pressed at the place where they grow, thus giving the best chance of preserving them so as to retain their natural appearance. Drying goes on very quickly, the air passing freely through the wires, especially when hung up, while if it is necessary to apply heat, the moisture readily escapes, a great advantage over the presses with solid frames.

I have used such presses for many years, often having three or four going at the same time, and I can strongly recommend them.

To prove to you how satisfactory they work, I would ask you to examine the plants shown here. They were collected by myself near the Rhine several years ago and pressed and dried by one of these presses, with a result that I think you will agree is perfectly satisfactory.

The President and Messrs. Salter, Stark and Williams commented upon the comparatively simple and efficient nature of the press and its portability.

Mr. Stark asked if the bent wires did not tend to injure delicate or brittle specimens, and Mr. Ellwood inquired if any irregularity in drying was noticeable.

Mr. Helbing, in reply, said experience would teach the collector how best to arrange his plants to ensure uniform pressure; the lattice-work arrangement facilitated the drying process, and by a proper disposition of the paper and the specimens no fear of misshapen or discolored specimens need be anticipated.

Commercial Surgical Gauze.—A Quick Method of Preparing Gauzes.

BY H. HELBING, F.C.S.,

Apotheker of the German Hospital, Dalston.

Although gauzes are not in this country so much handled by chemists as is the case abroad, a few remarks on them and their preparation may nevertheless be of interest. There is no doubt that such articles are of an entirely pharmaceutical character, and as such, should be monopolized by the pharmacist, instead of being in the hands of persons frequently incompetent to judge of their quality and purity. Strange to say, although we have plenty of tests for ascertaining the purity of ordinary drugs and chemicals, few people ever test the purity of a gauze, which is the more surprising when we consider the wide differences in quality of the antiseptic dressings in commerce.

Cheapness is certainly no proof of purity, rather the contrary, for if we go into the details of manufacture we shall often find that the actual cost of preparing an article in any way reliable, that is from proper raw material and the requisite quantity of antiseptic agent, exceeds the prices at which some houses offer their goods. Good raw material is of the first importance in preparing gauzes. This should be perfectly free from fat, should have at least thirty threads each way in a square inch, and should weigh about 10 drachms to the square yard. This is about the average for good stuff, though if we examine the various gauzes on the market, we shall find that only the very best houses furnish a material of this standard. I have myself examined a number of samples and give a few of the figures:—

Samples.	Weight of square yard.	Number of threads per square inch.
1 .	. 12 drachms .	. 44 × 44
2 .	. 10 „ .	. 31 × 31
3 .	. 7 „ .	. 15 × 15
4 .	. 6 „ .	. 17 × 17
5 .	. 5½ „ .	. 26 × 26
6 .	, 5 „ .	. 27 × 17

Gauze is sold here by measure, an entirely wrong principle, as unless the buyer knows the weight and the number of threads he cannot tell what he gets for his money. Supposing the samples I have given you were all made into 10 per cent. iodoform gauze. Nos. 1 and 2, as you will readily understand, would contain nearly double the amount of iodoform in each square yard of any of the others, and if when finished they were charged at double the rate of the others, it would only be a fair price. This shows how important it is when procuring such articles to ascertain the weight of the gauze and the number of threads. Of course the gauze should also be tested to see that it contains the percentage of antiseptic claimed.

Gauzes are usually kept ready by the chemist, but it may sometimes happen that a medical man may want a gauze for a case of emergency, and if the chemist have none in stock he cannot supply, as he is unable to procure it in time. In such urgent cases it is an advantage to be able to prepare the gauze oneself, and this can be done in a few minutes by following these directions. Take the necessary quantity of raw material and then weigh out a corresponding amount of the antiseptic.

The material is now saturated with ether or a mixture of alcohol and ether, in which the antiseptic has been dissolved, 1 ounce of the material requiring about three ounces of liquid. The gauze is several times wrung out and again saturated, so as to ensure uniform impregnation, and for drying the gauze is now simply unfolded and shaken a few times, when it is ready for use.

In this manner all the different gauzes may be prepared, carbolic, corrosive sublimate, iodoform, thymol, eucalyptol, or any other.

To show you the practical working I will now prepare you a small quantity of 10 per cent. creolin gauze, which has gained great favour in Germany, owing to the non-poisonous but strong antiseptic properties of its constituents. I do not say this is a cheap process but that it is of great utility in urgent cases.

Mr. Ellwood said the note was a very useful one. It was not customary, he believed, for chemists to test their gauze; they commonly retailed it without question. Nevertheless gauze of guaranteed purity was to be had; that there was a great disparity in commercial samples was apparent from Mr. Helbing's remarks.

Mr. A. C. Stark said he did not think the relative weight of the gauze of so much importance as the number of meshes to the inch, since some gauzes were much coarser in fibre than others; the strength of the

antiseptic would of course be measured by weight. He should like to point out that very many gauzes in the English market were made with a waxy or oily medium. Such gauzes were, he thought, quite useless; they were non-absorbent, and owing to their oily nature, the antiseptic did not come into contact with any discharge that took place. Carbolic acid and oil had for this reason been found useless as an antiseptic.

Mr. Salter said he could confirm Mr. Helbing's statements as to the great differences that existed between gauzes; he had had occasion to examine some samples but a few days before the meeting, and pieces which were identical in length scaled $3\frac{3}{4}$ and 7 ounces respectively.

Mr. A. H. Mason said the members present were indebted to the author, who possessed such facilities for becoming acquainted with the subject as to enable him to speak authoritatively. The chief consideration with hospital authorities, who were the principal consumers, was that of cheapness, and no doubt that element was answerable in great measure for the variable qualities of gauze. He advocated the adoption of a standard, a proposition which he stated had already met with pretty general adoption on the continent, and in one case had been introduced into the Pharmacopœia, and Mr. Helbing's standard approximated closely to this. He indicated that it was a matter of great importance that the executive of large hospitals should be educated up to the fact that cheapness was not the only desideratum; too often every other point was sacrificed to this.

Mr. Richards inquired if any definite information could be given respecting the new "antiseptic," which had been mentioned incidentally, and of which they had heard so much recently. He also expressed the opinion that much gauze took as its source the "shoddy" works rather than the spinning mills.

Mr. Helbing said in reply that the number of threads in the square inch corresponds pretty regularly with the weight of the gauze, and the continental authorities generally stipulated the number of threads and the weight. The question of wax in gauze was a medical point; he thought it was not of any use. He knew that gauze was almost monopolized by the wholesale dealer, and his object had been to direct the attention of the pharmacist to a legitimate extension of his business. It was necessary that the antiseptic material should be, if possible, applied in solution; the fibre of the cotton thus became impregnated. The process he recommended for the extemporaneous production of medicated gauzes was applicable in the case of any antiseptic that was soluble in ether, alcohol or chloroform.

Ointment Bases.

BY H. HELBING, F.C.S.,

Apotheker of the German Hospital, Dalston.

So many improvements have been made of late years in almost every branch of pharmacy, that it is all the more surprising we should still be so behindhand as regards ointments. I will not give you a long dissertation on the various ointment bases. Their merits and drawbacks are too well-known, but we will just glance oven them, comparatively.

There is no doubt that lard is an excellent base when fresh and free from water, or in other words when it is not rancid; but unfortunately we all know how difficult it is to keep lard, whether simple or combined, and especially when made up into ointments or mixed with watery solutions, for any length of time unchanged.

Vaseline, under which term I include all the different paraffin compounds, has failed to fulfil the hopes entertained when it was brought out. It has been proved that it does not mix with water.

The various compounds of starch and glycerine were found to be too easily decomposed to be at all reliable, and the only bodies left are mollin and lanolin.

Mollin, which is the so-called superfatted soap, has not proved at all satisfactory as an ointment base, from either the medical or the pharmaceutical standpoint. Lanolin, however, still maintains its reputation.

On its first introduction lanolin was of course very different to the refined product of to-day, but even in its crude condition medical men and chemists thought it likely to become a very valuable ointment base.

To the medical man, it had several excellent qualities, easy absorption, etc., while the pharmacist soon recognized that it never turned rancid and was miscible with more than double its weight of water. The chief, practically the only drawback to its use, was its viscidity, though this has not prevented its being included in the new Austrian Pharmacopœia.

Many attempts to overcome this stickiness were made, during the process of manufacture, for instance, as well as in other ways. I myself have spent much time in trying to improve its usefulness as an ointment base, and after numerous experiments believe I have succeeded in producing a compound which I think is satisfactory, and which I have called "Unguentum Lanolini." It is prepared as follows:—

65	parts	anhydrous lanolin
30	,,	liquid paraffin
5	,,	cerasin

are melted together and 30 parts of water beaten into the mixture.

Ungt. lanolini has, as you see from the sample exhibited, a smooth, almost white appearance, and is quite free from any stickiness. It mixes readily with its own weight of water, and in my opinion is an ideal ointment base for either official or non-official preparations.

I had a few ointments prepared with it several weeks ago, and shall be glad if you will examine them and convince yourselves of the elegance and the advantages of this product.

I have specially brought this matter to your notice, as I think that the article is not as well known as its merits deserve, and there can certainly be no better means of introducing such an article, than to submit it to the members of this Association, as they are constantly engaged in practical dispensing, and will accordingly be better able than anyone else to judge of the merits of an ointment base such as "Unguentum Lanolini," which is readily miscible with water, easily compounded, has an elegant appearance, and does *not* turn rancid.

Mr. Ellwood remarked that ointment bases had long formed a bone of contention amongst pharmacists. He was of the opinion that if lard could always be obtained pure and could be preserved in that condition, it formed the most satisfactory ointment base they possessed. The difficulties in the way, however, were well nigh insurmountable. He believed the disappointment arose not so much from the lard itself as from the impurities it so often contained. The mixture of lard and soft paraffin as used in what might be termed the "antiseptic" ointments of the Pharmacopœia had many commendable points, the great disadvantage was its non-absorbent character. Lanolin had always been remarkable for a characteristic stickiness, which was still apparent in Mr. Helbing's specimen. He thought this undesirable quality might possibly be removed by paying attention to the chemical composition of the fat and trying the action of various solvents in the light of the chemical knowlege that would be thereby acquired.

Mr. A. H. Mason said he thought the question of lard had been settled for ever after the Bath Conference.

He would like to know if Mr. Helbing had treated lard and vaseline in the same fashion as he had experimented with lanolin, and, if so, were the results in any way comparable. He also remarked upon the sticky nature of lanolin, which had not been overcome by Mr. Helbing, for it was perceptible in the specimen submitted, and stated that it might be obviated to a considerable extent by the addition of "cimolite," and such a preparation was easy to wash off and found favour with many dermatologists.

Mr. A. C. Stark said he considered the question of the best ointment base to depend entirely on the ointment to be made. All ointments were not intended to act by absorption (and, indeed, medical authorities were not agreed as to the value of absorption by the skin). In cases where local action only was required, there was no better medium than the B.P. mixture of hard and soft paraffin, and where absorption was to be aimed at, unquestionably lanolin was the most suitable. It was impossible to get an ointment base that would answer every requirement, both medical and pharmaceutical, in every case. While congratulating Mr. Helbing on his mixture, he did not regard it as by any means perfect, and if the idea was to rid lanolin of its stickiness the author certainly had not succeeded. In May of two years ago there appeared some researches by Dr. Guttman, in which the absorbing power of the skin for lanolin was denied; perhaps Mr. Helbing, as a compatriot of the author's, could tell him something about this.

Mr. W. L. Williams said the absence of the property of being saponified was disadvantageous to the use of refined petroleums.

Mr. Richards objected to the name lanolin; he did not see why the article should not be called by its proper name of sheeps' wool fat; in certain skin diseases of the scalp he had not found "sheeps' wool fat" to give results which were nearly as satisfactory as he had obtained with lard.

Mr. Helbing said lanolin was a purified sheeps' wool fat, and as the medical profession were anxious to obtain pure products he thought the term might still be used to designate the purified article. Another advantage in a special name was that it tended to secure a more uniform article. He had not conducted comparative experiments with lard and vaseline. Anhydrous lanolin was sticky and not easily worked, but the lanolin ointment he introduced was readily manipulated. The Austrian Pharmacopœia had sanctioned the making of mercurial ointment with lanolin, and Liebreich supported its application in the same connection. Gottstein proved also that it was easily absorbed, and that no microbes could exist in it.

A vote of thanks to the author was proposed by Mr. Mason and seconded by Mr. Stark.

At the meeting of the Association on the 5th inst., Mr. T. A. Ellwood, President, in the chair, a paper was read on—

The Preparation of Microscopical Sections from Barks and Roots used in Pharmacy.

BY M. J. COLE.

Barks and roots that have been dried must be cut into small pieces and soaked in water for several hours; this will cause the tissues to swell up and regain, to a certain extent, their natural shape. They are then to be transferred to methylated spirit, which should be changed every twenty-four hours until no colour comes away from the tissue. They will then be ready for cutting into sections, or they may remain until required.

Fresh specimens should be cut into small pieces and placed in methylated spirit, which should be changed as above until no colour is given off from the tissue. The hardening will usually be complete in a week, or they may remain for any length of time until required for cutting.

Some barks will be found too hard to cut; they may be softened by soaking for a time in liquor potassæ, then wash well in water until all trace of potash is removed.

Section Cutting.—Fairly good sections may be made by hand with an ordinary razor. Hold the piece of tissue in the left hand, keeping the forefinger straight so that it may form a rest for the blade of the razor to slide on. A good strong army razor answers very well. Hold it firmly in the hand and keep the handle in a line with the blade and draw it from heel to tip through the tissue towards yourself. Keep the blade well wetted with dilute methylated spirit, and as the sections are cut place them in a saucer of spirit or water.

Section-cutting with a Microtome.—If really good sections are required, a microtome of some kind should be employed. A very good and complete instrument, capable of being used for making all kinds of microscopical sections, can be obtained from Messrs. W. Watson and Sons, of 313, High Holborn. Screw the microtome to a firm table, and with the tube supplied with the machine, punch out a cylinder of carrot to fit the well of the microtome. Cut this in half longitudinally, and scoop out sufficient space in one-half to take the tissue to be cut. Put the other half of carrot in its place, and make sure that the tissue is held quite firmly, but it must not be crushed. Now place the whole in the well of the microtome, and commence to cut the sections with a strong razor or the section knife that is supplied with the machine when desired. Keep the blade of the knife well wetted with dilute spirit, and as the sections are cut, place them in a saucer of spirit or water.

Bleaching.—Vegetable sections generally require bleaching before they can be properly stained. A solution of chlorinated soda is usually used. Soak the sections in distilled water to remove the alcohol. Pour off the water and add a quantity of the bleaching solution, and allow it to act for from three to twelve hours, or until all colour has disappeared from the sections, then transfer to water, which must be changed several times until all trace of soda is removed.

Staining Sections.—The best staining fluid for general purposes is logwood. Take 2 ounces of ground logwood chips, place them in a calico bag and run water through it until scarcely any colour comes away. Drain away as much water as possible, remove the logwood from the bag and spread it in a thin layer on a tray to dry. Dissolve 2 drams of potash alum in 12 ounces of distilled water. Put the logwood into a vessel, pour on the alum solution and let it stand for forty-eight hours. Strain through muslin, and add 4 ounces of glycerine and 1 ounce of rectified spirit, mix well together, filter through paper, and add a small lump of camphor to make the mixture keep. Place the section in distilled water.

Add from thirty to forty drops of the logwood solution to an ounce of distilled water, filter, and immerse the section for three or four hours. Wash well in distilled water and then soak for a short time in ordinary tap water to fix the colour.

Transfer to methylated spirit for ten to fifteen minutes to dehydrate.

Take a small saucer or watch-glass full of clove oil and carefully float the section on to the surface of the oil and let it soak for five or ten minutes. When quite clear, wash in turpentine and mount in Canada balsam.

The logwood solution may be used undiluted for quick staining, but better results are obtained by the slower process.

Mounting in Canada Balsam.—Take 4 ounces of dried

canada balsam and dissolve in 4 fluid ounces of benzole, filter, and keep in a good outside-capped bottle.

Clean a slide, place some balsam on its centre, take the section from the turpentine with a lifter, and place it in the balsam on the slide. Now clean a cover glass, and with a pair of forceps bring its edge in contact with the balsam on the slide; ease it down carefully so that no air bubbles may be enclosed, and press down until the section lies quite flat. Now put the slide away for a day or two so that the balsam may set, and then take a soft brush and with some benzole wash away the exuded balsam from round the edge of the cover. Allow the slide to dry and apply a good coat of gold size, and when this has dried wash the slide with some soap and water; dry well with a soft cloth and add a coat of asphalt.

Double Staining.

Aniline Acid Green Stain.

Acid green	2 grains.
Distilled water	3 ounces.
Glycerine	1 ounce.

Mix the water and glycerine well together and dissolve the green in the mixture.

Carmine Stain.

A.

Borax	10 grains.
Distilled water	1 ounce.
Glycerine	½ ounce.
Alcohol	½ ounce.

Dissolve the borax in the water and add the glycerine and alcohol.

B.

Carmine	10 grains
Liq. ammonia	20 min.
Distilled water	30 min.

Dissolve the carmine in the ammonia in a test tube, with the aid of heat, if necessary, and add the water. Mix A. and B. together and filter.

Place the section in the green stain for five to ten minutes. Wash well in distilled water. Place in carmine stain for ten to fifteen minutes, wash in methylated spirit in which the section must remain for at least ten minutes. Clear in clove oil and mount in C. balsam.

Mounting Sections in Glycerine Jelly.—Place the section in distilled water and soak until all trace of alcohol is removed. Warm the jelly and place a few drops on the centre of a clean slide and put the section in it. Clean a cover glass and apply it in the same way as directed for balsam. Allow the slide to cool and then the exuded jelly may be scraped away with a penknife and the slide washed with water. Dry well with a soft rag and apply a coat of gold size, and when this has dried, add another of asphalt.

I am indebted to Mr. Fawsett, of Messrs. Evans, Lescher and Webb, for the specimens used to illustrate this paper.

A brief discussion followed the reading of Mr. Cole's paper, in which Messrs. Ellwood, Rogers, Bird, Richards and Tompsett joined.

Mr. Davis proposed and Mr. Chattaway seconded a vote of thanks to the author, who acknowledged the compliment in a few graceful words.

A discussion as to the position of unqualified sellers of poison, introduced by Mr. Blackham, then followed, and was eventually adjourned to a special meeting on the following Tuesday. The result of the discussion has already been published in this Journal.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

A meeting was held on Thursday, December 12, Mr. E. White, Vice-President, in the chair.

A paper on "Titanium and its Compounds," by Messrs. A. J. Simons and A. O. Scrivener was read, and will be published in a future number of this Journal.

The paper was fully illustrated by specimens of the metal itself and its salts, which had been prepared by the authors, and by an extensive collection of the minerals which contain this element.

It was followed by a discussion, in which the Chairman, Secretary, Messrs. Norman and Sherlock took part.

Mr. R. H. Norman then gave a Report on Botany. The first part of the report consisted of a *résumé* of recent researches on karyokinesis, and was explained and elucidated by means of a series of coloured diagrams, showing the appearance of the nucleus at different stages of the process, and as seen from different sides. The subject of classification, especially with regard to cryptogams, was next discussed, the author upholding the argument of Goebel, that the absence of chlorophyll in the fungi is not a sufficient reason for separating them from the algæ into a distinct division. Lastly, the author commented on the loose way in which the terms "spore" and "gonidium" were used, sometimes even interchanged, and defined the proper use of the words.

A discussion followed, in which the Chairman, Secretary, Messrs. Pears, Sherlock and Shepheard joined.

Mr. Sherlock then called attention to the fact that in preparing ammonio-citrate of bismuth a dark-coloured flocculent precipitate, or residue, is often observed, when the citrate of bismuth is dissolved in the ammonia. This, on examination with the microscope, proved to be a fungus, which had probably grown on the bismuth citrate, and was rendered evident on the salt dissolving. If the solution was effected while being watched under the microscope, the filaments of the fungus could be observed coming into view as the opaque salt disappeared.

The meeting then adjourned.

Obituary.

JAMES ABBOTT.

A name, which has for many years stood alphabetically first upon the Register of Pharmaceutical Chemists, has been removed by the death, on December 2, of Mr. James Abbott, of Leeds.

Mr. Abbott was born in Leeds, and after serving an apprenticeship there, passed two or three years as an assistant with Messrs. Corbyn, Stacey and Co., High Holborn. He then opened in his native town a business which he retained until his decease. An early-developed taste for the pursuit of botany gave the bias to Mr. Abbott's employment of his leisure time, if such a term can be applied to long morning excursions, sometimes commencing before daybreak, in company with an equally zealous pharmaceutical friend. Such energy brought a thoroughness in the knowledge gained that fitted well with Mr. Abbott's strongly-marked individuality. He was not accustomed to take for granted demonstrable facts in relation to his own science, and he thus accumulated a large store of familiar acquaintance with plants and their life-history that made him a very interesting companion alike to skilled naturalists and to those on the threshold of botany. His enthusiasm was often exhibited in the study of some of the forms of pond-life, so familiar to him, when he would call in a

passing friend to observe the revelations of the microscope, that was his constant companion in his pharmacy.

Mr. Abbott was one of the earliest provincial teachers of natural history science to avail himself of the special summer course of practical work organized by Professor Huxley at South Kensington under the designation of assistant studentships in biology. The systematic training thus acquired was of great value subsequently. For a short period Mr. Abbott acted as demonstrator in biology in the Yorkshire College, under Professor Miall.

In relation to pharmacy Mr. Abbott lectured for several sessions on botany and materia medica to students of the Leeds Chemists' Association, and often received medical and pharmaceutical students for private instruction in these subjects. Papers read before the Leeds Chemists' Association, "On the Extracts of the British Pharmacopœia," and "The Preservation of Syrups," are reported in past volumes of this Journal.

About three years ago, Mr. Abbott underwent a surgical operation, since which time his strength had slowly failed, limiting his capacity for work, but hardly lessening the interest which he took in natural history studies.

The attendance at the funeral at St. Mark's Church on December 5 was large, and indicated the esteem felt for the deceased. The Leeds Chemists' Association was represented by Messrs. Brown, Reynolds, S. Taylor, and Yewdall, as well as by some of its Associates. The Leeds Naturalists' Club attended in the persons of Mr. Fairley (Borough Analyst), Mr. Washington Teasdale, Mr. Roebuck, Mr. Pocklington, Mr. Hainsworth (School Board), etc., and several members of the medical profession were also present. Mr. Abbott leaves a widow and one son who has nearly completed the curriculum for the medical profession. Aged 58 years.

Notice has also been received of the death of the following:—

On the 28th of November, Mr. Thomas Waters, Chemist and Druggist, Caerphilly, Glamorganshire. Aged 75 years.

On the 2nd of December, Mr. Daniel Morrison, Chemist and Druggist, West Bow, Edinburgh. Aged 54 years.

On the 4th of December, Mr. Page Dewing Woodcock, Pharmaceutical Chemist, High Street, Lincoln. Aged 69 years. Mr. Woodcock had been a Member of the Pharmaceutical Society since 1853.

On the 6th of December, Mr. George Gray, Chemist and Druggist, Castle Street, Edgeley, Stockport. Aged 75 years.

On the 6th of December, Mr. James Alexander Mackay, Chemist and Druggist, Spittal Street, Edinburgh. Mr. Mackay was an Associate of the Pharmaceutical Society.

On the 7th of December, Mr. Henry James Blackbourn, Chemist and Druggist, late of Liverpool. Aged 45 years.

On the 7th of December, Mr. Benjamin Goddard, Chemist and Druggist, London Street, Southport. Aged 45 years.

On the 8th of December, Mr. Edwin Preston Carlton, Chemist and Druggist, High Street, Doncaster. Aged 43 years.

On the 10th of December, Mr. John Henry Elmitt, Chemist and Druggist, Bull Ring, Horncastle. Aged 38 years.

On the 12th of December, Mr. Richard William Frizell, Chemist and Druggist, Cranbourn Street, Leicester Square, W. Aged 51 years.

On the 16th of December, Mr. Henry Edward Goddard, Chemist and Druggist, Northgate Street, Great Yarmouth. Aged 73 years

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

The New Pharmacy Bill.

Sir,—Having watched the movements of the pharmaceutical body for forty-five years, I do not look with great expectations upon the prospect of another Pharmacy Bill. Looking at the report of the discussion in the journal, the first thought is, "What does the President say? Nothing!" and I repeat it, "What does the President say? Nothing!!"

Perhaps he thinks the more, and finds matter for his philosophical study in the words that fell from his unruly team. Viewing the matter as an outsider, *i.e.*, outside the Council, there are many points that strike me as worthy of being noted.

A Bill which will meet with no opposition, will excite no enthusiasm and do no good—perhaps I should say "little" rather than "no"—such a Bill would be the Curriculum Bill pure and simple. It would not be a bad thing to accomplish, but the good in it is so microscopical that the slightest opposition would swamp the enthusiasm, if a spark of such existed, and failure to carry it would likely result. There are many, like myself, who would accept it with much indifference and little hope. I believe there are more who would see such a measure pass with a feeling of doubt, much indifference and a little fear. There are many who would sign a petition either for or against such a measure if asked by a neighbour who could in a few words plausibly display his pros or cons.

The prospective speedy decay and death of the Pharmaceutical Society is a matter to excite attention, but not much either of wonder or alarm. The President is building its monument in Bloomsbury Square. The decay need not cause any surprise, because the Pharmacy Act makes the vitality of the Society depend upon a class of men, the existence of whom the preamble of the Bill does not declare to be expedient and the provisions of the Bill do not take care to foster. The Bill holds out no inducements to Major graduation except that pharmaceutical chemists are exempt from juries, and most disinterested witnesses would say that there was as much or more ground for this exemption applying to Minor graduates, men who as a rule feel more keenly the struggle of existence and whose businesses are less generally in the hands of qualified assistants while the principal may be away; consequently through whose absence the interests of the individual and the safety of the public are more likely to suffer.

To make the Bill consistent with public good, the exemption should be extended to those who for the safety of the public are qualified to keep open shop; or if this is not necessary for the public safety, those who hold the ornamental degree should cease to have this exemption from a public duty and this advantage over their less favoured brethren.

The decay of the Society is not a cause for alarm so long as it is evidently for the public good. The chief danger to its existence is the evidence of selfish motives, with the professed aim at public safety: the evident aim at personal advantage, the petty jealousy of small honours, the striving of incompetent men to acquire the stamp of qualification. If it be evident that the existence of the Society is for the public good, the public will take care that it does not cease to exist.

In my young days the Preliminary examination was considered the apprentices' degree, the Minor was for assistants, and the Major was the qualification for a principal. When examination ceased to be optional with those who wished to carry on the drug trade, the Minor became the qualifying examination, and should have carried with it all the powers required for the maintenance and management of the Society.

I agree with several of the speakers that the sooner this is put right the better, whether the change involves the extension of the title Ph.C. or not. The objection of those who do not like to see their title of Ph.C. made too com-

mon is unworthy of anyone professing to seek the good of the public, the good of the trade at large, or even the narrower good of the Society. I am surprised that Mr. Martindale ever felt that objection. It was one of the follies of his youth. At the present day Ph.C. adds nothing to the glory of his name, but rather the good work he has done adds lustre to those titular letters.

I am glad to find various of the speakers acknowledge the truth that the only way to effectually combat the co-operative stores and limited liability companies is to let it be seen by the public that public interests are better cared for by the pharmacist than by the large organizations. In this particular the public have a great deal to learn, a great difficulty in seeing with the eyes of the pharmacist, and the pharmacists have great difficulty in seeing with the eyes of the public. If the board could institute an examination in this species of binocular vision, they would do a good work in pharmacy.

The great slur upon the examinations is that the holders of the degrees, Minor or Major, are constantly found to be wanting very much in "competent practical knowledge of their business."

While examination alone fails to secure the desired competence, examination following a curriculum more than doubles the probability that the graduate will have that species of knowledge which the curriculum is calculated to supply and the examination to test. But the two together are far from insuring the "competent practical knowledge" which is desirable for public safety.

One of the great weaknesses of the whole system lies in the tendency to underrate the value of thoughtful attention to daily work. This underrating results from the constant pushing to the front of the fictitious though legalized qualifications.

During the last twenty or thirty years I have had many assistants, Major and Minor, graduates who have astonished me by their want of the practical knowledge which their degree was supposed to guarantee. Men who were distinguished by their ability in their classes or examinations, failing in their ability to put their knowledge to use as a practical guide in their daily work; a modified man who did not know the meaning of 5 per cent.;" a Major man who thought the adult's cough mixture containing laudanum would be all right for children, if he put the children's cough mixture label upon it, and so on with many other cases. My conviction is that the common sense of assistants has diminished, in consequence of the fictitious value set upon book knowledge and examinations. These latter, if superadded to the development of practical knowledge derived from experience, would make men successful either as assistants or principals. That the passing of examinations does not guarantee the graduate's competence to conduct his business is a discovery likely to be made by a generation of Minor men. Another fact which should not be lost sight of is that a man who has acquired a competent practical knowledge of his calling will not retain that knowledge unless he finds it useful in his daily life, and this the majority will scarcely do till there is pharmacy for the pharmacist. In this particular the public advantage coincides with increased business to the pharmacist, but this implies that our numbers must not be in excess of public requirement.

We have heard often enough about opening the doors of the Society to admit the outsiders. Those who propose to do this again must do it with caution, remembering the saying that through the open door the steed was lost. Some of the Ph.C.'s finding the door open again might feel tempted to trot out. And the outsiders have never shown much desire to trot in. Why should they? They might earn the name of a more humble animal if they trotted into a stable where there is so little corn. So long as the druggists are in any way governed by regulations of the Pharmaceutical Society, it would accord with the principles of constitutional government that they should have the power of influencing the election of Council. It would be reasonable that the legally qualified man should be qualified for membership and all the little privileges of the Society. Altogether I fear the privileges are too small to tempt any considerable number of outsiders to walk into our parlour. The chief difference to the Society would be that one source of discontent or jealousy would be removed.

Newcastle. BARNARD S. PROCTOR.

ALCOHOLIC EXTRACT OF SCOPOLA.

Sir,—Will you kindly insert the following correction of an obvious error in the formula suggested for alcoholic extract of scopola, which appears in my paper on "The Pharmacy of *Scopola Carniolica*" in the last number.

As then stated, it was found that the official rectified spirit was best suited for the preparation of this extract, but in the formula a weaker spirit is inadvertently directed to be used.

The amended formula should read as follows:—

"EXTRACTUM SCOPOLÆ ALCOHOLICUM.
Alcoholic Extract of Scopola.

Take of—

Scopola rhizome in No. 20 powder	1 pound.
Rectified spirit	3 pints.
Distilled water, Sugar of milk	of each a sufficiency.

"Macerate the scopola in 2 pints of the spirit for forty-eight hours, agitating occasionally; then transfer to a percolator, and when the fluid ceases to pass continue the percolation with the remainder of the spirit. Afterwards subject the contents of the percolator to pressure, filter the product, mix the liquids, and evaporate over a water-bath to the consistence of a soft extract."

This is estimated and adjusted to standard strength as directed in the paper.

Hitchin. F. RANSOM.

SCOPOLA CARNIOLICA.

Sir,—About thirty years ago I remember seeing in an old fashioned garden in Essex a number of plants which I could not then determine; but the plate in the *Pharmaceutical Journal* of December 14 enables me to recognize them as *Scopola carniolica*. The gardener called it a root of mandrake, and very poisonous. Salmon, in the 'English Herbal,' 1710, gives a fairly good plate of it under the name of "the other kind of deadly nightshade." He says, "Its root is great and spreads it self out into many branches underground, with many fibres adjoining to them. It has an upright crested or cornered stalk, with many leaves thereon, being longer and narrower than those of the true sleepy nightshade, and more inclining downwards to the ground, full of veins running longwise and traverse therein. At the joints of the stalk from the middle part upwards come forth several pendulous flowers, hanging by very long stalks, being long and hollow like unto a bell flower, of a purplish colour, each of them set in a large green husk, dented or cut into five parts at the edges, but not very deep: in which after the flower is past, comes forth a round berry, of a deep blackish purple colour, and having a crown-like form at the head of the berry, which has a wine-like juice and many small white seeds within it."

OCTAVIUS CORDER.

Re GORSE SEEDS.

Sir,—Permit me to suggest, in reply to a letter which appeared in your issue of November 16 from Mr. Octavius Corder, of whom, I regret to say, I have no personal knowledge, that he should look further afield before he so boldly assigns motives for the actions and conduct of other people, and that, too, in the total absence of any knowledge of facts or circumstances.

I may remind him that there was no reason whatever to put up at any wayside inn, and also, that there was no such place to trust to, and, moreover, that as I was close to my own residence, where dinner was already prepared for me, it may perhaps occur to Mr. Corder there was not the least occasion to do so, even had there been the modest accommodation referred to.

I cannot think that it shows the best possible taste to treat in a spirit of levity that which nearly cost me my life, nor do I consider that he has been very successful in his effort to appear facetious or turn into a jest that which undoubtedly was a very serious matter.

It would perhaps assist to clear Mr. Corder's faculties if he were compelled to "make" a few meals of no greater gravity than the eighty seeds he so kindly introduces into his very silly and uncalled-for letter.

Woolsthorpe. G. WELBORN.

COMMUNICATIONS, LETTERS, etc., have been received from Messrs. Smith, Sawer, Wood, Robb, Morrison, Tubby.

LIBRARY

"THE MONTH."

What is Saccharin?

In a thesis published a short time since, Dr. Dohme stated that having occasion for a supply of orthobenzosulphonic acid he sought to prepare it from commercial saccharin, which was supposed to consist of orthosulphaminebenzoic acid, or as he prefers to call it, benzoic sulphinide (*Amer. Drug.*, July, p. 140). On examining, however, a sample obtained in commerce he found that it was far from being a homogeneous compound and that in fact it contained only about two-fifths of its weight of benzoic sulphinide, the actual sweet principle. An approximate analysis showed it to consist of from 30 to 40 per cent. of benzoic sulphinide, mixed with 50 or 60 per cent. of parasulphaminebenzoic acid, and about 10 per cent. of orthotoluenesulphamide and the acid ammonium and potassium salts of orthosulphobenzoic acid. According to Dr. Dohme saccharin may be easily tested as to the proportion of the sweet principle it contains by treating it with ether, which dissolves out the benzoic sulphinide, so that all that remains undissolved may be considered foreign matter. A writer in the *Archiv der Pharmacie* (Dec. 15, p. 1100), in commenting on the foregoing, says that he has had a similar experience with a German sample of saccharin, which contained only about 40 per cent. of benzoic sulphinide soluble in ether. For its solution a large quantity of hot water was required, and the first products of crystallization appeared to be a mixture of at least parasulphaminebenzoic acid and benzoic sulphinide. In addition, similar statements have been made by Messrs. Remsen and Burton, who draw a conclusion to the effect that the sweetening powers of commercial saccharin do not represent more than half the full capability in this respect of benzoic sulphinide (*Chem. Zeit., Rep.*, Nov. 16, p. 305). The correctness of this latter statement especially is now practically admitted by Dr. Fahlberg, who in a communication to the *Chemiker Zeitung* (Dec. 4, p. 1603) takes the position that "saccharin" is not sent out as a homogeneous preparation, but as one that is standardized to have a sweetening power equal to three hundred times that of cane sugar. He alleges that benzoic sulphinide itself possesses a sweetening power equal to 500 times that of sugar, and says that commercial "saccharin" contains pretty constantly 60 per cent. of this compound. The presence of the potassium salt of orthosulphobenzoic acid he denies, on the ground that it is excluded by the conditions of manufacture, but he suggests that about 0·5 per cent. of chloride and sulphate of potassium that is usually present has given rise to the mistake of reporting its presence. Lastly, Dr. Fahlberg states that for those who require it a "saccharin. puriss." is prepared, which is 500 times as sweet as sugar. The foregoing illustrates one of the difficulties that may attend the introduction into pharmacopœias of substances that are the subject of patents under trivial names, since it would often lie with the manufacturers to determine within considerable limits the characters of the compound that should be supplied under a particular name. It is only fair to Dr. Fahlberg to state that he says the physiological experiments credited to saccharin have been made with the mixed article.

Phenylurethan.

"Phenylurethan" is the name given to a new compound that has been commended for its antipyretic, antirheumatic and analgæsic properties by Professor Giacomini in the Turin Academy of Medicine (*Pharm. Zeit.*, Dec. 4, p. 740). It is represented as being a compound belonging to the aromatic group, resulting from the combination of aniline with chlorocarbonic ethyl ether, and occurring as a white crystalline powder, insoluble in water and freely soluble in concentrated alcohol. Phenylurethan is claimed to act as an energetic and certain antipyretic, while at the same time exercising a beneficial influence on the general system. A dose of 0·5 gram is said to be equal to 1 gram of antipyrin, and to be sufficient to produce a fall in the temperature of from one to three degrees Celsius, lasting from nine to twelve hours. In acute and chronic articular rheumatism it is said to relieve the pain and reduce the swelling of the joints, for which purpose it is given in doses of 0·5 gram. As an analgæsic it produces in some cases a favourable result, whilst in others the result is negative. The form recommended for its administration is as a solution in Marsala wine, which is said to prevent collapse, cyanosis and other unpleasant symptoms.

Diuretin.

Under the name "diuretin" a sodio-salicylic compound of theobromine, corresponding to one of the so-called soluble salts of caffeine, has been introduced as an advantageous diuretic (*Apot.-Zeit.*, Dec. 14, p. 1338). According to Dr. Gram, of Copenhagen, theobromine is a diuretic, acting directly upon the kidneys, differing from caffeine in not affecting the central nervous system, and therefore not causing sleeplessness and restlessness. It is said to have produced satisfactory diuresis in cases of renal and heart disease in which digitalis and strophanthus have been without effect. But as the free alkaloid requires about 1600 parts of water for its solution it is not readily absorbed, and gives rise to disturbance of the stomach. Diuretin, on the other hand, is alleged to produce the beneficial effects of theobromine without the unpleasant symptoms. It is described as occurring as a white powder containing 50 per cent. of theobromine, dissolving with the aid of heat in less than half its weight of water, and remaining in solution after the liquid has cooled. It is administered to the extent of about six grams daily in one gram doses.

Naphthalene.

Dr. Tichborne suggests that the powerfully antiseptic and germicide properties of naphthalene might be utilized in the treatment of typhoid fever (*Med. Press and Circ.*, Dec. 11, p. 603). He has found that one crystal of this compound placed in three or four ounces of urine will delay the conversion of urea into ammonium carbonate for days, and even weeks, although it is not more soluble than camphor in water. Its relative insolubility in most solvents would, he thinks, be an advantage in typhoid, as the naphthalene would pass through the bowels undigested. The proper dose would have to be settled by experiment, but Dr. Tichborne states that he has himself taken two grain doses every hour without any other observable result than the deodorization of all fecal matter. For this purpose he points out that the hard crystalline form in which naphthalene is usually met with would be advantageously replaced by a fine precipitate that can readily be obtained by pouring a solution of the compound in strong alcohol or glacial acetic

acid into cold water while stirring, collecting and washing the precipitate and drying with a gentle heat. If necessary that it should be given in a liquid form he suggests that it should be dissolved in some fixed oil and an emulsion made. It may be remarked that about five years ago Professor Rossbach reported that he had found naphthalene useful in chronic diarrhœa and intestinal catarrh and cystitis, the quantity administered being two to three grains per day (*Pharm. Journ.*, [3], xv., 344).

Diiodosalicylic Acid.

At the recent congress on therapeutics and materia medica, held in Paris, a communication was read by Dr. Calalb, of Bucharest, upon the therapeutic employment of diiodosalicylic acid, which has now been published (*Nouv. Rém.*, Nov. 24, p. 595). The compound, which was introduced as an antipyretic some time since, is represented by the formula $C_6H_2I_2OH \cdot COOH$, according to which it would be salicylic acid in which two atoms of hydrogen in the benzene residue have been replaced by two atoms of iodine. Dr. Calalb reports that in his hands diiodosalicylic acid, when administered in cases of acute polyarticular rheumatism, has produced effects comparable to those following the use of salicylic acid or salicylates, with the advantage that it has succeeded as a remedy in some cases where they have been powerless. Besides its analgæsic and antithermic properties, diiodosalicylic acid is said to act upon the circulation, modifying the systolic action of the heart and the number of beats until it stops in diastole. At the commencement of treatment the doses were limited so as not to exceed 1·5 gram daily, but this quantity was increased cautiously, in some cases to as much as 4 grams daily. In addition, as might be expected, diiodosalicylic acid is claimed to be a powerful antiseptic.

Natural and Artificial Salicylic Acid.

Some experiments as to the comparative action of natural and artificial salicylic acids and their salts by Dr. M. Charteris and Mr. W. Maclennan are recorded in the *British Medical Journal* (Nov. 30, p. 1208). From the symptoms observed the authors conclude that the samples of artificial salicylic acid and sodium salt used by them contained an impurity or impurities, to which they attribute the restlessness, confusion, delirium and greatly protracted prostration sometimes observed as following their use. In corresponding samples of artificial salicylic acid Mr. G. A. Henderson, of the University of Glasgow Chemical Laboratory, found a small quantity of another acid, which is never present in samples of the natural acid, and which he thinks may be derived from cresol or some other impurity in the phenol from which the salicylic acid has been made. It is well known that nearly a dozen years since the late Mr. John Williams called attention to an impurity occurring in artificial salicylic acid at that time and exhibited some crystals that are still in the Museum of the Pharmaceutical Society. Although the exact nature of the compound was not then determined it was ascertained that it differed in its chemical reactions from salicylic acid, and Mr. Williams named it provisionally cresylsalicylic acid, as suggestive of its probable origin. It should be stated that the artificial salicylic acid employed in Dr. Charteris and Mr. Maclennan's experiments was a white satiny powder in fine silky crystals resembling quinine, but that the salicylate of sodium was in small crystalline plates with a slight pink colour. A somewhat sweeping statement of the authors that unless otherwise indicated the artificial acid is invariably used for dispensing purposes has naturally drawn forth some reclamations.

Sulphoricinic Acid.

In a recent communication to the Société de Thérapeutique (*Journ. Pharm. Chim.*, Dec. 15, p. 573), M. Berlioz referred to the value of sulphoricinic acid in pharmacy as a vehicle for certain compounds when required for topical application. Naphthol, salol, creosote and carbolic acid all form with it solutions which give with water a perfect emulsion comparable to milk. In this way, without heat, 10 per cent. solutions of naphthol and carbolic acid can be made, which yield by simple dilution with water antiseptic liquids that have been found useful in the treatment of affections of the nasal cavities, the pharynx and the larynx.

Quinoline as a Preservative.

Attention has been called recently by Herr Rosenthal to the value of solutions of quinoline for the preservation of anatomical specimens (*Münch. med. Woch.*, Dec. 3, p. 868). Aqueous solutions of the hydrochlorate, tartrate and salicylate, containing equal to 0·1 to 0·2 per cent. of the base, are said to have proved very effective for the purpose. The hydrochlorate is, however, preferred, the solution being prepared by suspending a weighed quantity of quinoline in water and adding dilute hydrochloric acid, with continual stirring, until all the quinoline is dissolved. Should an excess of acid be used this may be neutralized with weak soda liquor and the solution then diluted to the required strength. The formula adopted in the Erlangen physiological institution is: quinoline, 5 grams; sodium chloride, 6 grams; glycerine, 100 grams; water, 900 grams. The ordinary tar quinoline can be used. The liquid is said to have the advantage of preserving all the tissues in their natural condition, except that it removes from them all colouring matter. Quinoline is also said to be a convenient preservative for digestive liquids, as an addition of it, in the form of salicylate, whilst preventing any putrescence does not in the least interfere with the activity of the digestive ferment.

Antipyrin Incompatibility.

Under the heading "Incompatibility of Antipyrin and Naphthol," M. Chabrol records a difficulty met with in dispensing some powders each containing β-naphthol, antipyrin, āā 0·10 gram; bismuth salicylate 0·25 gram (*Bull. Comm.*, Nov., p. 521). It was found that in whatever order the substances were mixed the final product was a liquid paste. The difficulty was overcome by mixing the antipyrin with five times its weight of sugar, and then adding the naphthol and bismuth salicylate, though of course this proceeding may be productive of inconvenience to any other dispenser who is subsequently called upon to make up the prescription. It will be noticed that the title of the paper represents the incompatibility as existing between the antipyrin and the naphthol, but as it will be remembered that a few months since (*Pharm. Journ.*, April 27, p. 862) a similar liquefaction was mentioned as taking place when antipyrin and sodium

salicylate were dispensed together in the powder form, it might be thought probable that in this instance also the salicylate plays a part in the reaction. This proves, however, on experiment, not to be the case, for whilst a mixture containing only antipyrin and naphthol became pasty, one consisting of antipyrin and bismuth salicylate has remained a dry powder for several days. It may be added that on the former occasion it was stated by a correspondent (*Pharm. Journ.*, May 11, p. 920), that the mixture of antipyrin and sodium salicylate does not liquefy if kept in a closed bottle.

Nomenclature.

Referring to the suggestion recently made as to the nomenclature of some of the new compounds (*Pharm. Journ.*, Sept. 28, p. 241), which was based upon their relation to antifebrin, M. Petit makes the same objection as was raised in these columns to the use of a name in which any proprietary rights exist. He pertinently suggests that it would be no more difficult to take "acetanilid" as a starting point, and then "acetanilid," "bromated acetanilid," "methylated acetanilid," "oxymethylated acetanilid," and "oxyethylated acetanilid," would represent antifebrin, asepsin, exalgin, methacetin and phenacetin respectively. For another group of compounds he proposes to take the word "phenylhydrazin" as a basis, when pyrodin would become "acetylated phenylhydrazin," and the analogous compounds "formylated," "butylated," "amylated," and so on.

Digitalin.

As is known there exists on the continent considerable diversity of opinion as to the substance to which the name "digitalin" is properly to be applied. The German views on this point have already appeared in these columns (*Pharm. Journ.*, [3], xvii., 163); it may be convenient therefore to summarize the French opinion respecting it as recently expressed by Dr. Bardet (*Nouv. Rem.*, Nov. 24, p. 590). In the French Codex the name "digitalin" is officially applied to two preparations, one crystalline and the other amorphous, but both are required to be entirely soluble in chloroform. These preparations have been alleged by German writers to consist not of digitalin but of digitoxin, and various authorities have stated that the crystalline preparation is much more powerful than the amorphous one. Dr. Bardet, however, claims to have established experimentally that the two Codex preparations, which he speaks of generally as "chloroformic digitalin," are identical in their activity and effects and represent the only well defined derivative of digitalis, although he prefers the crystalline as being slightly more pure. On the other hand he says that German digitoxin, as it occurs in commerce, differs from the Codex preparations in not being completely soluble in chloroform and in being only one-half or one-third as active. The substance named digitalin in Germany is said to be an indefinite substance, resembling digitalein in being insoluble in chloroform and soluble in water and in its action, which in both cases is variable and always much less than that of chloroformic digitalin.

New Sugar Reagent.

At a recent meeting of the Mulhouse Industrial Society M. Matthieu-Plessy described a new reagent for cane sugar, grape sugar and pyrogallic acid, consisting of a solution of lead paranitrate ($PbHNO_4$) in an excess of melted ammonium nitrate (*Mon. Scient.*, Dec., p. 1446). It is prepared by melting 54 parts of ammonium nitrate and adding to it 34 parts of lead nitrate and 21 parts of lead hydrate. The reagent melts at about 115° C., and in contact with glucose it gives a cherry-red colour, with cane sugar the colour of *café-au-lait*; and with pyrogallic acid a chrome green colour.

Ash-free Albumen.

In a recent communication to the Berlin Chemical Society (*Berichte*, xxii., 3046) Herr Harnack describes the preparation of albumen which yielded no ash when burnt and presented some noteworthy characters. It was prepared by repeatedly dissolving and precipitating a metallic albuminate, obtained by treating a solution of a copper salt with a solution of albumen freed from globulin and otherwise as pure as possible. When all trace of phosphates had been removed the albuminate of copper was decomposed and the albumen obtained free and otherwise unaltered. In this condition it was found not to be coagulated by boiling and apparently incapable of passing into the coagulated state; it was not precipitable by alcohol, ether, carbolic acid or tannin; with pure cold water it thickened and gradually assumed the appearance of a solution, especially upon heating to boiling temperature; from this solution it was precipitated by neutral salt solutions (again soluble on strong dilution) and by acids (insoluble in excess), but not by alkalies; and the albumen did not lose these properties on evaporation of the solution to dryness at 100° C.

Oil of Birch and Oil of Wintergreen.

In August last (*Pharm. Journ.*, Aug. 31, p. 166) a paper was published by Messrs. Trimble and Schroeter on the oils of wintergreen and birch, in which the authors controverted some earlier statements and expressed the opinion that the oils are physically and chemically identical, both of them consisting mainly of methyl salicylate, and in addition containing a hydrocarbon of the formula $C_{15}H_{24}$ together with small quantities of benzoic acid and ethyl alcohol. They also stated that a sample of artificial oil of wintergreen examined by them possessed the properties neither of the natural oil nor of methyl salicylate. This paper has called forth an energetic rejoinder from Dr. Power (*Pharm. Rundsch.*, Dec., p. 283), in which he gives the results of the examination of a number of samples. The conclusions he arrives at are that natural oil of gaultheria consists of methyl salicylate and 0·3 per cent. or less of a lævogyre terpene; that oil of birch, when pure, consists simply of methyl salicylate, and is inactive towards polarized light; and that neither of them contains benzoic acid or, as far as he has been able to satisfy himself, any ethylic alcohol. A sample of oil of birch supplied as genuine by the same agents as supplied Messrs. Trimble and Schroeter with oil examined by them was found by Dr. Power to be sophisticated with kerosene. Dr. Power also failed to detect a trace of benzoic acid in a representative sample of artificial oil of wintergreen.

Aloes in Cascara Sagrada Extract.

A few months since a statement appeared in an American journal to the effect that fluid extract of cascara sagrada had been met with containing aloes (*Drug. Bull.*, July, p. 288). Accordingly Herr Reuter was induced to experiment as to the best means of detecting the presence of such an adulterant. From the results obtained

he is of opinion this is to be found in the application of Klunge's cupraloin reaction (*Pharm. Zeit.*, Dec. 7, p. 745). Two drops of the extract are diluted with 10 c.c. of water so as to form a faintly yellowish coloured liquid and five drops of 10 per cent. solution of sulphate of copper added. Herr Reuter says that liquid extract of aloes treated in this way gives a yellow colour; a genuine liquid extract of cascara sagrada a blue green colour; and a mixture containing equal quantities of the liquid extracts of cascara sagrada and aloes a yellow colour. Upon the addition then of about 2 c.c. of a 20 per cent. solution of sodium chloride and a few drops of alcohol, the liquids from the extract of aloes and the mixture of the two immediately assume a purple red colour, while that from extract of cascara remains unaltered. As the reaction is somewhat obscured by the suspended resin, ten to twenty drops of the extract may be evaporated, the residue taken up with water, the liquid filtered and to the filtrate ten to twenty drops of the copper sulphate solution added, followed by some sodium chloride and a few drops of alcohol, when the reaction occurs with great sharpness. In a later communication (*Pharm. Zeit.*, Dec. 14, p. 761) Herr Reuter's communication is somewhat sharply criticized by Herr Conrady, who expresses the opinion that extract of cascara sagrada is much more likely to be adulterated with extract of *Rhamnus Frangula* than with extract of aloes.

Adulterated Saffron.

At the last pharmaceutical meeting at the College of Pharmacy in Philadelphia, Mr. Beringer directed attention to an adulterated saffron at present in the market, which he stated was mixed with a kind of grass stained with some colouring matter, most probably a coal oil colour, and weighted with sulphate of calcium, another sample containing sulphate of sodium. Similar samples have already made their appearance in this country, but the vegetable filaments are easily recognized when the saffron is placed in water, while the sample stains the paper in which it is wrapped of a red rather than saffron colour. Professor Maisch remarked that good saffron could always be obtained by those who chose to pay the price for it, and that excellent saffron produced for home use was grown in Pennsylvania, in Lancaster and Lebanon counties, and that the surplus was sold for its weight in silver. Pure saffron, according to Messrs. G. Kuntze and A. Hilger (*Journ. de Pharm. et Chim.*), should give not more than 8 per cent. of ash on incineration, and a filtered infusion made with boiling water should give no precipitate during evaporation. A drop of concentrated sulphuric acid should give a deep blue, rapidly passing to brown. Out of sixty samples of saffron examined by the authors only five were found to be pure.

Crozophora tinctoria.

Dr. J. Hornsey Casson, Physician to Her Majesty's Legation in Persia, recently called the attention of the Director of Kew Gardens to a plant which caused the death of six persons at intervals varying from thirty-six to seventy-two hours with symptoms of severe jaundice, abdominal pain, bilious vomiting, dilation of pupil, bleeding from the nose, constipation, bloody urine tinged with bile, and stupor (Kew *Bulletin*, p. 279). The plant turns out to be *Crozophora tinctoria*, an Euphorbiaceous plant, yielding the blue dye known as turnsole. This has been described by Hanbury in the *Pharmaceutical Journal* ([1], ix., 308), and Lindley in 'Flora Medica' (p. 179) mentions it as possessing emetic, drastic and corrosive properties.

Iodide of Ethyl in Bronchitis.

Dr. R. Main reports (*Brit. Med. Journ.*, Nov. 30, p. 1216) that he has found an inhalation of ten minims of the iodide of ethyl extremely beneficial in cases of bronchitis and bronchial catarrh, complicated with Bright's disease and fatty heart, especially when the dyspnœa is urgent and the bronchial secretion viscid; about five minutes after inhalation free expectoration results. He believes that this action of the iodide is worthy of attention on the part of medical practitioners.

Phosphorus in Diabetes.

Mr. Balmanno Squire records (*Brit. Med. Journ.*, Nov. 30, p. 1216) a case in which phosphorus dissolved in oil was given for eczema, and, in addition to having a most beneficial effect in that disease, it had also a most marked remedial action on diabetes from which the patient was also suffering. It was given in perles containing one-thirtieth of a grain, to the extent of one-tenth of a grain a day for three days, and then one-fifth of a grain daily for seven days. He thinks this result due to the well known action of phosphorus on the liver.

Chromic Acid in Hyperidrosis.

Experiments made on a large scale in the German army as to the best treatment for excessive perspiration of the feet indicate that chromic acid is superior to all other applications. Out of 18,000 cases only 8 per cent. were unrelieved by it, 42 per cent. being cured and 50 per cent. improved. A 5 per cent. solution of the acid is used, and is applied with a brush after bathing and then drying the feet. Two or three applications are generally sufficient, but sometimes the treatment has to be repeated in a fortnight.

Ammonia in Cocaine Poisoning.

A case of poisoning by a comparatively small quantity of cocaine is described by Dr. Golovkoff in the 'Proceedings of the Caucasian Medical Society' (*Lancet*, Nov. 30, p. 1126), in which ammonia was successfully used to restore the pulse and respiration to their natural condition. The ammonia was given internally in doses of a few drops every five or ten minutes, and liquid ammonia was also given to the patient to smell. In about two hours the patient had quite recovered.

Transformation of Sugar into Starch by Plants.

It is evident from the researches of Saposchnikoff (*Ber. deutsch. bot. Gesells.*, viii., p. 258) that sugar can be turned into starch in the leaves of plants. He placed plants of various sorts in the dark for a time, then cut off some leaves and divided them in halves along the midrib. One half was tested for starch, the other was laid for four to ten days in a 10 to 20 per cent. solution of cane sugar, and then tested for starch both by iodine and by Faulenbach's method. Starch was found in abundance, especially along the veins. In variegated leaves only the chlorophyllous cells formed starch.

Pollen of Pontederia cordata.

Mr. Byron D. Halsted has examined the pollen of this plant, which has trimorphic flowers, and finds that the relative sizes of the pollen in the three forms vary more than in any other known trimorphic plant, being relatively in the proportions of 16, 13, 9 (*Bot. Gaz.*, p. 257).

The Pharmaceutical Journal.

SATURDAY, DECEMBER 28, 1889.

Communications for the Editorial department of the Journal, books for review, etc., should be addressed to the EDITOR, 17, *Bloomsbury Square.*

Instructions from Members and Associates respecting the transmission of the Journal should be sent to MR. RICHARD BREMRIDGE, *Secretary*, 17, *Bloomsbury Square, W.C.*

Advertisements and payments for Copies of the Journal, MESSRS. CHURCHILL, *New Burlington Street, London, W. Envelopes indorsed "Pharm. Journ."*

PHARMACEUTICAL ORGANIZATION.

THE very excellent paper read before the Manchester Pharmaceutical Association by Mr. KEMP a fortnight since, deals with one of the sorest grievances affecting all engaged in the business of chemists and druggists. The disregard of the advantages to be derived from the maintenance of representative organizations appears to be a remarkable characteristic of the class, not only at Manchester, but also throughout the kingdom. While other trades and occupations of a more professional nature have their local organizations and general representative associations, through the medium of which the interests of the various bodies can be protected and promoted, there seems to be such a practical indifference prevailing among chemists and druggists, that no such organization can be maintained for long in a state of efficiency. It is difficult to assign a reason for this deficiency, for there can be no question that scarcely any class of persons have greater need of the protective assistance that is only to be hoped for from mutual co-operation and concerted action. Nor is the neglect of these measures to be ascribed to any inferiority of intelligence or education, for as Mr. KEMP very justly remarked, the average chemist is generally a man of more than ordinary intelligence, whatever exceptions must be made as regards particular individuals. The large number of chemists who occupy positions of honour in the public service alone furnishes evidence of their capacity and of the fact that it is appreciated. But still the fact remains that it is possible to say of such an important centre as Manchester that there is not an Association adequately representative of the legitimate drug trade of that populous district, and with some few exceptions the same may be said of other localities.

Nor is it only in regard to local associations that this pernicious indifference is manifested. The larger organizations that have been instituted for the representation of the entire body have not in any instance been supported by the individual members of that body as they ought to be. Even the Trade Association that was formed with the object of promoting the most obvious material interests of chemists and druggists, failed to receive such support as would have made it really powerful and efficient, and after a few years of languid existence it was allowed to become extinct. Similarly a due measure of support has been withheld from the Pharmaceutical Society, notwithstanding the various attempts that have been made to render it a truly representative body. While individual members of the trade persist in refusing to be represented by it, and in abstaining from any other participation in the direction of pharmaceutical affairs, beyond grumbling and bewailing their sad condition, even the Pharmaceutical Society will fall short of the power to deal with matters affecting their interests as it might otherwise do. Just as the members of the Society in the Manchester district have, to adopt Mr. KEMP's words, practically allowed themselves to be disfranchized, so have the chemists and druggists of the entire kingdom, who hold aloof from the Pharmaceutical Society, disfranchized themselves, and placed themselves beyond the only possibility of being beneficially represented. In the discussion of matters affecting the interests of the body, however, we constantly meet with involuntary evidence of the need there is for representation by a well-supported organization. In one of the letters that appear in this week's Journal, for instance, it is urged that the kind of Pharmacy Act that is wanted is one containing clauses prohibiting any persons, except duly qualified chemists, from dealing in drugs of any description. Such an enactment, we admit, would be eminently beneficial for chemists, and on the whole we believe it would also be for the benefit of the public. But without going into the general question as to probability of any measure being passed to establish a legislative monopoly in the sale of drugs, we may at least affirm, without fear of contradiction, that if ever such a measure, or one in any way approaching to it, were passed, it would only be through the agency of such a body as the Pharmaceutical Society, acting as the real representative of all the chemists and druggists in the kingdom who had any claim to be considered by the legislature.

Some weeks ago we called attention to the fact that the Revenue Act passed last session contains a provision that methylated spirit is not to be sold between the hours of 10 p.m. on Saturdays, and 8 a.m. on Mondays, under a penalty of one hundred pounds. We understand that in some instances this has escaped observation and therefore it seems desirable to supplement our previous mention of the new enactment by publishing the following notice that has been issued by the Board of Inland Revenue, bearing date November, 1889.

"NOTICE.

"To retailers of Methylated Spirits.

"Notice is hereby given that section 26 of the Revenue Act, 1889 (52 and 53 Vict. c. 42) prohibits the sale of methylated spirits between the hours of 10 o'clock on Saturday evening and 8 o'clock on the following Monday morning. Any person who sells methylated spirits in contravention of this provision of the law incurs for each offence a penalty of one hundred pounds.

"By order of the Board of Inland Revenue,

(Signed) "ROBERT MICKS, *Secretary.*"

Transactions of the Pharmaceutical Society.

EXAMINATIONS IN LONDON.

December 12, 13, 17, 18, 19 *and* 20, 1889.

Present on the 12th, 13th, 18th, 19th, and 20th.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gale, Gerrard, Greenish, Ransom, Saul, Symons, Tanner, Taylor and Thresh.

Present on the 17th.—Mr. Carteighe, President; Mr. Bottle, Vice-President; Messrs. Blunt, Bowen, Corder, Druce, Fletcher, Gale, Gerrard, Greenish, Ransom, Saul, Symons, Tanner and Taylor.

Dr. Stevenson was present on the 13th and 17th on behalf of the Privy Council.

MAJOR EXAMINATION.

12*th.*—*Seven* candidates were examined. *Two* failed. The undermentioned *five* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Cheney, Henry Robert .....Banbury.
Green, Herbert John .....Deal.
Higgins, Charles Alfred.....Manchester.
Hook, Richard Graves.....Bridgwater.
Masters, Henry .....Buxton.

13*th.*—*Eight* candidates were examined. *Six* failed. The undermentioned *two* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Roper, Frederick Alfred... .....Plymouth.
Thorp, Edwin .....Harrogate.

17*th.*—*Seven* candidates were examined. *Four* failed. The undermentioned *three* passed, and were declared qualified to be registered as Pharmaceutical Chemists:—

Gourlay, Henry Hamilton.....Lytham.
Greaves, Robert Bond.....Sheffield.
Hollely, Thomas Lowe .....Ollerton.

MINOR EXAMINATION.

12*th.*—*Twenty-five* candidates were examined. *Sixteen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Adcock, Robert McIntosh.....Sheffield.
Beattie, James Brown .....Fife.
Bircham, Jesse .....Reepham.
Boucher, Charles Ernest .....Bristol.
Branson, Preston James.....Plympton.
Calcutt, Thomas John .....Sevenoaks.
Clark, Alfred Turner Sims ...London.
Coulson, Thomas.....Leicester.
Symes, Charles Frederick .....Liverpool.

13*th.*—*Twenty-three* candidates were examined. *Ten* failed. The undermentioned *thirteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Branford, William .....Farnham.
Cooper, William .....Warrington.
Cowin, William Stephen .....Union Mills.
Emberton, Frederick Charles Silverdale.
Enness, Walter Frederick.....London.
Eyre, William Robert.....Ashbourne.
Farnworth, Walter.....Blackbourne.
Farthing, Herbert William ...Cardiff.
Fast, John Percival.....Wellingborough.
Foster, Ernest Lionel.....Plymouth.
Freeman, Arthur Alexander...London.
Greenwood, George Lister.....Keighley.
Jones, John .....Rhyl.

17*th.*—*Twenty-four* candidates were examined. *Twenty* failed. The undermentioned *four* passed, and were declared qualified to be registered as Chemists and Druggists:—

Bloomfield, Edwin James.....Leamington.
Grice, Walter Thomas .....Yardley.
Grieve, James .....Hawick.
Heath, Victor Charles .....Birmingham.

18*th.*—*Thirty-two* candidates were examined. *Seventeen* failed. The undermentioned *fifteen* passed, and were declared qualified to be registered as Chemists and Druggists:—

Harris, George William.....Nottingham.
Jones, Thomas.....Swansea.
Le Cudennec, Louis Edourd...Mauritius.
Lloyd, William Howard.....Leicester.
Lovibond, James Joseph .....Plymouth.
Making, Edwin James .....Sudbury.
Mallett, Henry Philip .....Norwich.
Marshall, Frederick Cornforth..Beverley.
Mason, Joseph Edwin .....Bexley Heath.
Mawer, William Fred .....Grimsby.
Merrick, W. Stephens Nickels..Exeter.
Moore, John.....Stafford.
Morgan, Alfred .....Market Drayton.
Palmer, John George.....Durham.
Walker, Herbert .....Nottingham.

19*th.*—*Twenty-nine* candidates were examined. *Nineteen* failed. The undermentioned *ten* passed, and were declared qualified to be registered as Chemists and Druggists:—

Kent, John Collison .....Wakefield.
Pearson, George Edward .....Northallerton.
Perfect, Egbert George.....Newark.
Quant, Ernest ....Winchcombe.
Sleight, Fred .....Louth.
Smith, Henry James .....London.
Spink, Arthur Bowman .....Westminster.
Symons, William.....Stoke.
Thomas, Frederick William ...London.
Westmacott, George Leonard.Manchester.

20*th.*—*Twenty-six* candidates were examined. *Seventeen* failed. The undermentioned *nine* passed, and were declared qualified to be registered as Chemists and Druggists:—

Umney, John Charles .....Sydenham.
Wake, George .....Howden.
Warner, George Oram .....Clifton.
Williams, Thomas John .....Plymouth.
Winfield, George Frederick...Birmingham.
Wood, James .....Nottingham.
Woolls, Victor John .....Margate.
Wright, Edward Goddard.....Doncaster.
Zusman, Harry .....Wolverhampton.

MODIFIED EXAMINATION.

17*th.*—*One* candidate was examined, and failed.

PRELIMINARY EXAMINATION.

20*th.*—Certificates by approved examining bodies were received from the undermentioned in lieu of the Society's examination:—

Clutterbuck, Charles .....Nottingham.
Coats, Alexander.....Pilrig.
Dobson, Thomas D. .....Broughty Ferry.
Ellam, George Henry.....Weaste.
Franks, Frank Richard.....London.
Freeland, James .....Bathgate.
George, John Arthur .....Sheffield.
Gillam, Walter Graham .....Brighton.
Hall, Alfred William .....Watford.
Moore, Clifford Bond.....King's Bromley.
Pitts, Herbert .....Norwich.
Richardson, H. N. Bardsley ...Leicester.
Rose, Francis .....London.
Taylor, George Orissa.....Norwich.
West, Joseph Arthur .....Peckham.

Retirement of Dr. Thresh.

On the motion of Mr. Gale, seconded by Mr. Taylor, it was unanimously resolved—

"That the Board desires to place on record its high appreciation of the services rendered to the Society and to pharmacy by Dr. John Clough Thresh during the period he has been a member of the Board. His colleagues venture to express their regret at his retirement from among them, and their best wishes for his future health and happiness."

Proceedings of Societies in London.

CHEMICAL SOCIETY.

At the meeting of the Chemical Society on Thursday, November 21, Dr. W. J. Russell, F.R.S., President, in the chair, the following papers were read :—

The Law of the Freezing Points of Solutions. By S. U. PICKERING.—Although the influence which a substance exerts in lowering the freezing point of a solvent, when used with caution, may give valuable evidence as to its molecular weight in the quasi-gaseous condition, it is impossible to accept Raoult's statement of the observed facts as a general law of freezing points. The so-called constant exhibits a variation of some 20 or 30 per cent. in the case of different substances (not counting those cases where the values are admittedly abnormal), and may also vary to the same, or to a greater, extent, when different proportions of the same substance and solvent are taken, even when we confine our attention to cases where the proportion is that of not more than 1 mol. to 100 mols. of the solvent. Still less can we, on the strength of the supposed constancy of the value, draw any conclusions from it respecting the nature of solutions. The author believes that he has found the law which regulates the freezing point of a solution of any strength. He attributes the lowering produced by the dissolved substance to three distinct causes, which he classifies as (1) mechanical, (2) physical, and (3) chemical. In the first place he points out that if a weak solution (taking water as a concrete instance of a solvent) consists, as he maintains it does, of a hydrate, the water which crystallizes out on cooling is derived from the hydrate itself; which is thermally possible, since the heat of solidification of the water is far in excess of the heat of formation of the hydrate. Hence the whole hydrate does not act as the "foreign molecule," but only that part of it which is not water, *e.g.*, H_2SO_4; and hence, also, the molecular weight obtained by Raoult's method is that of the H_2SO_4 and not that of the hydrate. But, although the decomposition of a complex hydrate into the next lower one and solid water is an exothermic change, such would not be the case with all the lower hydrates, and, in fact, the limit of possible decomposition is fixed very clearly at the hydrate containing $5{\cdot}5H_2O$. In the same way the limits of the two branches of each of the curves representing the crystallization of $H_2SO_4{\cdot}4H_2O$ and $H_2SO_4{\cdot}H_2O$, and that of the one branch of H_2SO_4 curve, can be established from thermochemical considerations, and all these limits agree very well with the nature of the curves obtained experimentally.

(1) *Mechanical Lowering.*—Considering the foreign molecules to be uniformly distributed throughout the solvent, and considering, also, for the sake of simplicity, that the molecules are stationary, the author argues that the solvent molecules will be entirely isolated from each other, and, therefore, will be prevented from combining to form the aggregates of which a solid is constituted, when there are 300 foreign molecules to every 100 molecules of the solvent. This value obtains only if we consider the molecules on a superficies, but the author argues on experimental as well as general grounds that crystallization is entirely a surface action. The temperature below which a liquid will not solidify is—160°, according to Person (see 'Trans.,' 1889, 32) : hence 300 foreign molecules to the 100 will lower the freezing point of water 160°, and one molecule will lower it by (160 ÷ 300 =) 0·53°, a constant closely approximating to that (0·63°) found by Raoult for various solvents freezing at about the same temperature as water. In the case of water, Raoult's work shows that the active molecule is not H_2O but $3H_2O$; the mechanical constant will, therefore, be (·57 × 3 =) 1·6°.

(2) *Physical Lowering.*—If water be superfused to $t°$ below its normal freezing point, and then be made to crystallize, the heat evolved in its solidification diminishes regularly with the value for $t°$ from 1430 cal. per H_2O at 0° to *nil* at −160° : if $t°$ be −79°, or any lower temperature, the whole of the water will solidify, whereas for smaller values of t, the amount solidifying is given by $\frac{t}{79}$, and the heat evolved in this partial solidification will always be exactly sufficient to raise the resulting mixture of ice and water from $t°$ to 0°. If, however, we take a hydrate, say, $H_2SO_4 13H_2O$, the freezing point (water crystallizing out) of which is −34°, the total water available for crystallization is only $7{\cdot}5H_2O$, for no amount of cold would suffice to decompose the residual hydrate $H_2SO_4 5{\cdot}5H_2O$; the amount of water which would crystallize would, therefore, be $\frac{34}{79}$ of $7{\cdot}5H_2O$, or $3{\cdot}2124H_2O$, and the heat evolved in its crystallization is easily calculated, being 3615 cal. After the crystallization a mixture of $3{\cdot}2124H_2O$ as ice $(7{\cdot}5-3{\cdot}2124)H_2O$ as water and $H_2SO_4 5{\cdot}5H_2O$ would remain, the total heat capacity of which is 223·5, and this mixture would be raised 16·17° by the 3615 cal. evolved, instead of 34°, as would have been the case had there been nothing but the water present. The freezing point, therefore, will have been lowered (34° − 16·17° =) 17·83° from this "physical" cause.

(3) *Chemical Lowering.*—A definite hydrate such as $H_2SO_4 13H_2O$ can only give up its water by decomposing into the next lower hydrate, $H_2SO_4 9H_2O$ in the instance taken; the heat absorbed in this change is given by the heat of dissolution curve (863 cal.), and will lower the temperature of a mixture with a heat capacity of 223·5 cal. by 3·5°. The sum of these three lowerings gives −33·64° as the freezing point, whereas −34·0° is the value obtained. The former is more strictly a calculated verification of the observed value than a calculated value; but it is in calculating the physical lowering only that the observed value is taken to start with, and the author finds that if a wrong value be taken for the freezing point the "calculated" value does not agree with it, and that by a series of approximations we might ultimately obtain the true value, starting with any temperature in the first instance. The following instances may be quoted :—

Hydrate.	Per cent. H_2SO_4.	F. p. found.	F. p. calculated.
$H_2SO_4, 130H_2O$	4·02	− 1·59	− 1·39
,, 60 ,, .	8·59	− 3·80	− 3·44
,, 24 ,, .	18·49	−11·83	−11·52
,, 13 ,, .	29·53	−34·00	−33·64
,, 9 ,, .	37·70	−72·63	−72·77

After the hydrate with $13H_2O$, the active water-molecule becomes simplified, attaining the formula H_2O before the hydrate with $9H_2O$ is reached. A similar simplification has been observed at about the same molecular composition in the case of mixtures of alcohol and water. Instead of calculating the freezing point, we may take the observed freezing point and calculate the heat evolved in the chemical action, and hence the composition of the next lower hydrate formed in the reaction. The values given by the last three of the above-mentioned freezing points are—

		P.c.		P.c.
Position of next hydrate.	Found	29·5	Calc.	31·1
,,	,,	37·7	,,	38·5
,,	,,	49·8	,,	49·5

In the other two cases the chemical lowering is so small in comparison with the errors inherent in the calculations, that the calculated position of the next hydrate is valueless. If no definite hydrates existed in solution, the chemical lowering would be absent; its absence would always increase the discrepancy between the observed and calculated values, and in the last three cases would destroy all semblance of agreement, the differences amounting to from 1·6° to 10·3°. In the case of very weak solutions (0·36 and 0·37 per cent.), the actual error between the observed and calculated values is less than 0·01°, but this is a relatively large quantity, and is probably due to errors in the experimental method adopted. A very striking confirmation of the composition of the hydrates at these points may, however, be obtained by comparing the figures representing the found and calculated values. Very definite proof is thus obtained that the author was wrong in supposing the existence of a hydrate with $510H_2O$ (1·0 per cent.), but right as to the others. The correctness of the calculated values affords proof not only of the position of the next hydrate, but also of there being a hydrate of the composition of the solution at which the f. p. is taken. Points intermediate between definite hydrates may be correctly calculated on the supposition that the liquid consists of a mixture of next higher and next lower hydrate; whereas if the calculation be based on the wrong supposition that the liquid consists of one definite hydrate, wrong values are obtained. Thus $H_2SO_416H_2O = 25·4$ p.c.; the f.p. found was $-23·0°$; that calculated for a mixture of $H_2SO_424H_2O$ and $H_2SO_413H_2O$ is $-22·36°$; that calculated for a definite hydrate is $-20·75°$. Very strong evidence of the existence of certain definite hydrates may be deduced from the limit assigned on thermochemical grounds ($H_2SO_45·5H_2O$) to the decomposition of the hydrates. Thus, taking the f. p. of the solution $H_2SO_213H_2O$, we get —34° as the found value, and —33·64 as the value calculated with the above-mentioned limit; whereas, if the limit be taken to the next hydrate above or below that with $5·5H_2O$, namely, those with 9 and $4H_2O$, we get —41·51 and —30·18 as the calculated values respectively; and, more important still, if we take that limit which would hold good on the physical theory of there being no definite hydrates in solution, which limit would be at about $H_2SO_47H_2O$, we get —37·11° instead of —34° as the calculated value. The results obtained in calculating the lowering of the freezing point of sulphuric acid by the addition of water do not, from several causes, agree so well with the observed values as in the case of the water curve; but the differences are not great, and, though they prevent the correct calculation of the composition of the hydrates present, they are not sufficient to prevent our drawing from them further important confirmation of the general truth of the author's theory, and of concluding that the active molecules are, in this case, H_2SO_4 and H_2O respectively. The results mentioned are the following:—

		F. p. found.	F. p. calc.
$36H_2SO_4H_2O$,	99·49 p.c.	— 3·05°	— 1·89°
12 ,,	98·49 ,,	— 8·85°	— 7·38°
6 ,,	97·03 ,,	—18·60°	—16·97°
3 ,,	94·23 ,,	—41·60°	—38·61°

these numbers representing degrees below the f. p. of the pure acid (10·35° C.). In the case of the crystallization of the monohydrate, the active molecule of sulphuric acid appears to be $12H_2SO_4$ throughout; while on the other branch of the curve where the f. p. is lowered by the addition of water, the "mechanical lowering" appears to be absent. This is probably due to the active molecule of water being very complex; if it were twelve times as big as it is when *it* is the crystallizing substance (*i.e.*, the same proportion which obtains in the case of the sulphuric acid molecules), it would be $36H_2O$, and the lowering thereby produced would be practically negligible. The magnitude of the active molecules of the "foreign substance" in this case is probably due to the fact that the crystallizing substance actually contains some of each of them, and therefore exerts less influence on them than would otherwise be the case. The fact that we have to determine the magnitude of the mechanical constant in the first instance from the curve does not detract much from the value of the deductions as to the calculated value; for one point is sufficient to give us the value of the constant, and we can then apply it in an indefinite number of other points. The instances given are—

Hydrate.	P.c.	F. p. found.	F p.calculated	Next hydrate.	
				Found.	Calculated.
				p. c.	p. c.
$H_2SO_4H_2O, \frac{1}{6}H_2SO_4$.	86·40	–2·2	–2·36	89·10	88·46
,, $\frac{1}{2}$,,	89·10	–9·8	–10·14	94·23	93·65
,, 2 ,,	94·23	(–60·7)	–63·19	–	–
,, $\frac{1}{6}H_2O$...	82·36	–2·10	–2·13	78·41	78·45
,, $\frac{1}{2}$,,	78·41	–15·41	–15·05	73·14	72·78

Of the 20 hydrates which the author has already announced as existing in the case of sulphuric acid, one has been definitely disproved by the present calculations; in the case of three others the evidence is insufficient to be termed proof; while proof of the most definite description is obtained in the case of the remaining. The hydrate $H_2SO_44H_2O$ is included, since the mere existence of the curve representing its crystallization is ample proof of its existence, though there are no data existing in this case at present on which to found any calculations of the freezing points.

Professor Ramsay said that it was impossible without careful study to offer any valuable criticism on so comprehensive a paper, opening up such new points of view. He drew attention to the fact that the supporters of Van't Hoff's theory of the existence of a substance dissolved in a liquid in a molecular state comparable with that of a gas by no means shut their eyes to the possibility, and in many cases the probability, of the existence of complex molecules, either of the solvent itself, or of compounds of the solvents with the dissolved substance. He also questioned the correctness of Person's data on which it was assumed that the "solid-liquid critical point" was—160°, inasmuch as it is founded on insufficient data regarding the specific heats of solids and liquids at low temperatures. With reference to the sudden change in the molecular complexity of the water-molecule, assumed by Mr. Pickering to occur between the hydrate with $13H_2O$ and that with $9H_2O$, he suggested that a gradual disruption of the complex water-molecule would be more likely, and stated that from experiments of his own it appeared more probable that the water-molecule consists of $4H_2O$. The existence of complex molecules of sulphuric acid he regarded as supported by the fact of there being double sulphates of such formulæ as $NaH_7(SO_4)_4$.

Mr. Pickering, in reply, said that it was quite true that Person's "absolute zero" of –160° was more or less hypothetical. But it was founded on considerations precisely analogous to those on which the "absolute zero" for gases, –273°, was founded; and, just as the latter, though hypothetical also, yields correct results in all cases where true gases are concerned, so

the former yields correct results in the case of liquids. He pointed out that the change of the acting water-molecule from $3H_2O$ to H_2O was not sudden, but was spread over a range 8 per cent. in the strength of the solutions. There were no signs of the change beginning before the solutions attained the composition $H_2SO_4 13H_2O$. Finally, although, according to Raoult's work, the active molecule of water in this and in the majority of cases appeared to be $3H_2O$, there were other instances in which it attained the magnitude $4H_2O$.

The Constituents of Flax. By C. F. Cross and E. J. Bevan.—The authors describe the results of their examination of the cuticular constituents of the fibre, the only investigation of which hitherto published is that of F. Hodges ('Proc. R. Irish Acad.,' 1881, iii., 460). On exhaustion with boiling alcohol the fibre loses 3–4 per cent. of its weight; as the solution cools it deposits a greenish-white resin, which on hydrolysis with alcoholic soda yields a wax alcohol, identified as ceryl alcohol. In addition to the alcohol an oily, ketone-like substance was obtained. The residue appeared to be unresolved: on submitting it to drastic treatment with alkalis, two fatty acids were obtained, one of which, from its equivalent and melting point, appears to be cerotic acid. A considerable residue of unresolved products remained. The green filtrate from the resin-wax yielded on distillation a green, oily residue. From this a further quantity (10 per cent.) of ceryl alcohol was isolated, and a much larger proportion of the oily ketone (15 per cent.); the residue being a complex of ill-defined, inert compounds, yielding "ketones" on hydrolysis. These "ketones" have the characteristic odour of raw flax and flax goods, and from their property of emulsifying with water, no doubt exercise an important influence on the wet processes of fine spinning of flax. The pectic group of constituents, associated with the cellulose in the fibre proper, was found to yield mucic acid on oxidation with nitric acid ($d=1{\cdot}15$). The isolation of a pure cellulose from flax is a difficult operation. The presence of unremoved cuticular constituents accounts for the statements of Godeffroy, that flax cellulose reduces silver nitrate when boiled with a neutral solution of the salt, pure flax cellulose resembling cotton cellulose in resisting the action of this agent. Flax cellulose oxidized with permanganate in alkaline solution yields, in addition to oxycellulose and oxalic acid, acid bodies, from which furfural is obtained by acid hydrolysis.

Acetylcarbinol (*Acetol*), $CH_3{\cdot}CO{\cdot}CH_2{\cdot}OH$. (*Preliminary Notice.*) By W. H. Perkin, Junr., and J. Bishop Tingle, Ph.D.

At the meeting held on Thursday, December 5, the papers read were :—

Compounds of Phenanthraquinone with Metallic Salts. By Francis R. Japp, F.R.S., and Alfred E. Turner.

Action of Aldehydes and Ammonia on α-Diketones. By G. H. Wadsworth, Associate of the Normal School of Science.

Phenylhexamethylene Derivatives. By F. Stanley Kipping, Ph.D., D.Sc., and W. H. Perkin, Junr., Ph.D.

Diphenylfurfuran. By W. H. Perkin, Junr., Ph.D., and Aug. Schloesser, Ph.D., M.Sc.

SCHOOL OF PHARMACY STUDENTS' ASSOCIATION.

At the meeting of this Association held on Thursday evening, the 12th inst., the following paper was read :—

Titanium and its Compounds.

BY A. J. SIMONS AND A. O. SCRIVENER.

Metallic titanium was discovered in 1789 by a clergyman named William Gregor, who first found it in the mineral ilmenite and named it menachin. Seven years later Klaproth, while investigating rutile, discovered a metal which he called titanium, and two years later he proved that it was identical with Gregor's menachin. Titanium is never found in the metallic state in nature. Combined with other elements it is found very widely distributed. Most clays and many seeds contain small traces of titanium. The chief minerals containing it are as follows. Ilmenite, a double oxide of iron and titanium, which contains about 30 per cent. of the metal and is found in Cornwall, Norway, United States of America and New Zealand. Washingtonite, which is very similar in composition to ilmenite, but contains less titanium. The oxide of titanium is found in nature in three different forms, the commonest of which is rutile, which crystallizes in the tetragonal system. It contains 98 per cent. of pure oxide, and occurs in Norway, Finland and St. Gothard. Brookite, which is found in rhombic plates, is a pretty red transparent mineral, containing about 94 per cent. of titanic oxide. It is most plentiful in the province of Dauphiny, at St. Gothard, and in the Urals. Anatase, the third native oxide of titanium, also comes from the province of Dauphiny; it contains 98 per cent. of the oxide.

Sphene or titanite is a silicate of titanium and calcium. It belongs to the monoclinic system, is of a black colour and very brittle. It is found in Norway, Tyrol, Renfrew and St. Gothard. Greenovite is a variety of sphene containing magnesium; it is of a pink colour and occurs at San Marcel. Lederite, another variety, is brown and comes from New York. Euxenite is a columbotantalate of titanic acid, yttrium and uranium. It contains 16 per cent. of titanic oxide. It is found at Arendal in Norway. Perofskite is a titanate of calcium. It is of a reddish brown colour, and is found in cubo-octahedrons at Magnet Cove, Arkansas. Mosandrite, a silicate of titanium and many other bases, is found in Norway. Warwickite is a borotitanite of iron and magnesium, it is of a dark brown to a dull black colour, and is found in small quantities in Norway and in Warwick County, United States. Polymignite contains 46 per cent. of titanium. It is a very rare mineral and comes from Norway.

The metal can be obtained by heating the double fluoride of potassium and titanium with metallic potassium or sodium, but when prepared by this method, nearly always contains some nitride and metallic potassium and sodium. A better method of preparing it is to place two porcelain boats, one containing the double fluoride of potassium and titanium, and the other metallic sodium, in a porcelain tube containing hydrogen, then heating the tube to redness. The sodium vapour reduces the titanium salt and leaves the metal in the form of a grey powder, from which the sodium fluoride can be removed with water. It is stated in Watts' that when titanic oxide is heated with one-sixth of its weight of charcoal in a charcoal crucible to a very high temperature metallic titanium is produced, but we failed to obtain any metal, producing by this method only bright scales of a lower oxide. S. T., in the *Chemical News* of March 17, 1871, states that he was unable to produce the metal by this method. Hern's method of preparing the metal is to pass a mixture of sodium vapour and titanium tetrachloride through a tube heated to redness. The metal prepared in this way will only decompose water at 500° C., while that prepared by the ignition of the double fluoride with metallic potassium decomposes it easily at 100° C. The metal is of a dark grey colour,

and takes no polish under the burnisher. When thrown into the flame of a bunsen burner it ignites with a bright flash. If a small portion is heated in oxygen vivid combustion takes place, a white powder, titanic oxide (TiO_2), being left. In the cold it has no action on chlorine, but when ignited in that gas the tetrachloride is formed, with the evolution of light and heat. In its properties it is closely allied to iron and chromium. The best steel is said to be that which is prepared from iron which contains a little titanium, and it is now added to iron in the manufacture of steel. With microcosmic salt it gives a bead which is yellow while hot, and violet when cold. If it is mixed with a little iron it gives a red bead. On the addition of peroxide of hydrogen to a solution of titanic oxide in hydrochloric or sulphuric acid, a yellow coloration is produced. This reaction does not take place if there is an excess of fluoric acid present, but in that case it can be brought about by the addition of a large quantity of hydrochloric acid. Fresenius proposed as a test a solution of hyposulphurous acid, prepared by dissolving zinc in sulphurous acid, which, when added to a solution containing titanium, gives a red coloration. These reactions take place when 1 c.c. of solution contains ·001 gram of titanium. Titanium is always estimated in the form of dioxide (TiO_2).

The best method is that proposed by Lévy, who fuses a weighed quantity of the sample with bisulphate of potassium and dissolves the residue in water that contains sufficient sulphuric acid to convert all the potassium into the state of bisulphate; he then adds 5 per cent. of sulphuric acid to the solution, boils for six hours, collects, washes, and ignites precipitate. Several oxides of titanium are known, the most important being titanic oxide (TiO_2), which is usually obtained by purifying rutile. This is accomplished by fusing the powdered rutile with three times its weight of potassium carbonate; the fused mass is poured on to an iron plate, and when cold, powdered, placed on a filter and washed with water until the powder begins to come through the filter paper. The residue is then dissolved in cold strong hydrochloric acid (which takes a long time). Sulphurous and acetic acids are added, and the solution boiled for two or three hours, when the titanium is precipitated and can be filtered off. Another method, giving a purer oxide, is to treat the fused mass with fluoric acid and add sufficient water to dissolve the double fluoride, filtering while quite hot. On cooling the filtrate, crystals separate, which are taken, dissolved in hot water, ammonia added, and the precipitate ignited.

When chlorine and hydrochloric acid vapour is passed over rutile or ilmenite, ferric chloride is volatilized and pure titanic oxide (TiO_2) remains. It can also be prepared from the tetrachloride, by diluting it with water and evaporating. Hydrosulphuric acid passed over rutile converts the iron into sulphide, but does not affect the titanium, and the sulphide of iron can be removed by washing with hydrochloric acid.

Titanic oxide (TiO_2) is a white powder, which when pure is without taste. When strongly heated it forms lumps which look like rutile. After ignition it is insoluble in hydrochloric and nitric acids, but slightly soluble in boiling sulphuric acid. This solution turns turmeric paper brown. When fused with microcosmic salt crystals of a phosphate separate; these were at one time supposed to be anatase. Artificial crystals can be prepared by the ignition of the fluoride in moist air and hydrogen. Titanic oxide can be fused before the oxyhydrogen blowpipe. The sesquioxide is obtained by passing hydrogen over strongly ignited titanic oxide (TiO_2). It is obtained as a by product in the preparation of the trichloride, by passing a mixture of hydrogen and vapour of tetrachloride of titanium over the oxychloride. Friedel and Guérin state (*Chem. Soc. Journ.*, xxx., p. 46) that they obtained the sesquioxide by the reaction of hydrogen and titanium tetrachloride on titanic acid, but we were unable to obtain it by this method, and our experience is confirmed by T. Koenig and O. Pfordten in a recent communication to the *Berichte*. It is of a bronze colour and appears in hexagonal plates under the microscope. Salts corresponding to this oxide can be prepared by dissolving titanium in hydrochloric acid or sulphuric acid. This sulphate crystallizes in groups of small crystals, which by oxidation with nitric acid form titanic sulphate. Titanium trioxide (TiO_3) can be prepared by adding peroxide of hydrogen in excess to a dilute solution of the tetrachloride in alcohol, and then adding ammonia; a yellow precipitate is obtained, which should be washed and dried. Another method of preparing it is to add barium dioxide to a solution of titanic oxide in sulphuric acid, keeping the solution cool, filtering from barium sulphate and adding ammonia to the clear filtrate, when titanium trioxide is obtained. It is readily soluble in hydrochloric acid, chlorine being given off.

Titanium combines with chlorine to form three compounds; the dichloride, trichloride and tetrachloride. The dichloride is exceedingly difficult to prepare, the best method being to take freshly prepared trichloride and introduce it into a retort containing carbon dioxide, and then replace the carbon dioxide with hydrogen, heat the retort on a sand-bath to redness, and pass a continuous stream of hydrogen until all the tetrachloride has distilled over, the hydrogen being then replaced with carbon dioxide, and the retort allowed to cool. Titanium dichloride is a black powder and very hygroscopic. When thrown on to water it hisses like phosphoric anhydride, liberating hydrogen and leaving a yellow liquid. It burns in the air, the tetrachloride being given off and the dioxide left. It unites with bromine, forming a compound having the composition $TiBr_2Cl_2$. Titanium trichloride is prepared by passing the vapour of titanium tetrachloride and hydrogen through a red hot tube. It can also be prepared by heating the tetrachloride with metallic mercury or silver, when the following reaction takes place:— $2TiCl_4 + 2Ag = 2AgCl + Ti_2Cl_6$. If too high a temperature is used the reverse reaction occurs. Titanium trichloride when prepared by the first method appears as violet scales, which readily dissolve in water. It burns in air, the tetrachloride being given off, and the oxide left as a white powder. The salts of gold, silver and mercury are readily reduced by it. It also unites with bromine. The tetrachloride is prepared by passing chlorine over a mixture of rutile and charcoal; it can be separated from the ferric chloride by redistillation over sodium. When pure it is a colourless liquid having a specific gravity of 1·7609. It boils at 135° C., and its vapour has a density of 6·836. It smells very acid and gives off white fumes when heated in the air. When passed over heated metallic sodium it is decomposed. It dissolves in water, and when exposed to the air it takes up water and becomes a crystalline solid, which is soluble in a large quantity of water. Titanium tetrachloride unites with ethers forming compounds. The yellow colour of the commercial chloride is due to ferric chloride. Titanium oxychloride ($Ti_2O_2Cl_2$) can be prepared by passing hydrogen and the tetrachloride over red hot titanic oxide (TiO_2). It forms rectangular laminæ of a brown-red colour; it is not decomposed by water or nitric acid, but on exposure to air it turns white, titanic oxide (TiO_2) being formed. Only one bromide of titanium is known ($TiBr_4$), which is prepared by passing the vapour of bromine over a mixture of titanium dioxide and charcoal heated to redness. The red crystalline product can be purified over mercury. The pure bromide is very hygroscopic; it is of an amber-yellow colour, specific gravity 2·6, melting at 39° C. and boiling at

220° C. Titanium tetraiodide (TiI_4) is obtained by passing the vapour of iodine over ignited titanium. It can also be prepared by passing hydriodic acid through a solution of the tetrachloride heated to its boiling point. It forms a brown crystalline mass, soluble in water. It melts at 150° C. and distils without decomposition at 362° C. Titanium tetrafluoride can be obtained by distilling in a leaden retort a mixture of titanium dioxide, fluor spar and fuming sulphuric acid. The tetrafluoride distils over in brown oily drops which dissolve in water.

Potassium titanofluoride is prepared by fusing the oxide with three times its weight of potassium carbonate and dissolving the fused mass in fluoric acid; it is soluble in hot water, and loses its water of crystallization at 100° C., fusing at a white heat. Sodium titanofluoride can be prepared in a similar manner. Four nitrides of titanium have been prepared, Ti_2N_2, Ti_3N_4, Ti_2N_3 and Ti_5N_6. The first of these is found in the slag of blast furnaces, and was at one time supposed to be metallic titanium. The second is obtained by heating the ammonia chloride of titanium by itself or in ammonia gas. The third, Ti_2N_3, is prepared by passing ammonia gas over a mixture of the ignited dioxide and sesquioxide. It is a bronze-coloured powder which on ignition in air leaves titanic oxide (TiO_2). Ti_5N_6 is prepared, according to Roscoe, when Ti_3N_4 is ignited in hydrogen, ammonia being given off, and a golden-yellow substance formed which is not decomposed at a very high temperature if air is excluded. Titanium sulphide is formed when carbon disulphide is passed over titanic oxide (TiO_2) ignited to redness; it has the form of copper-coloured scales which burn in air.

CHEMISTS' ASSISTANTS' ASSOCIATION.

At a meeting of the Chemists' Assistants' Association held on Thursday evening, December 12, Mr. Ellwood, President, in the chair, the following paper was read:—

History of Botany.—(Herbaria).

BY G. C. DRUCE, M.A., F.L.S., ETC.

Before touching upon the more especial subject of my paper, which I must explain is rather a compilation of other works than an original thesis, I thought it would be well to assume that to some, at any rate, among you a brief account of the history of botany would not be altogether unwelcome. In all ages and in all countries of the globe vegetables have been a principal article of human food, primeval man being essentially a frugivorous feeder, and thus early must he have had an elementary knowledge of plants, since roots, fruits and herbs being his food, he would soon find out those which were more or less easy of digestion. He would discover, as Pulteney says, the flatulent kinds and such as corrected flatulency, which acted as astringents, and which possessed alterative or laxative properties, which were most nutritious, and probably by fatal accident such as were poisonous. A knowledge of the various species would gradually increase, together with some idea of distribution and some rude differentiation of plant form. A woody trunk would soon be distinguished from an herbaceous one. A tree and a shrub, an annual and a perennial herb would not long be confounded. The form, the consistence, the colour of fruit would be mastered. Hence the rudiments of botany and medical science. Oral tradition would carry down the knowledge, and possibly the names of the discoverers of new foods, or the medicinal properties, until by length of time their names might become venerated as gods, for doubtless intimately mixed up with religion would be the profession of the healing or killing art, and quite early in the history of our race would be the union of priest and physician.

Moses appeared to have been acquainted with three characteristic divisions of plants. Grass, of which the seed was for some time doubtless overlooked or disregarded, herbs, which bear their seed in a dry pericarp, and trees, with all other vegetables which have their seed inclosed in a pulpy or some other edible substance. It will be noticed by readers of the first chapter of Genesis that in the grant of vegetables to man for the purpose of food only the two latter are mentioned; the first being reserved for the beasts of the earth and the fowls of the air, and everything that creepeth on the earth. Solomon is celebrated for his knowledge of plants, but all that we know of it is that he spake of them from the cedar of Lebanon to the hyssop on the wall. In Britain we know that the Druids had some knowledge of plants, but the little that we can learn from Pliny or Cæsar shows that the uses of the plants were attended with the utmost superstitious rites; for to the mistletoe, the vervain, the selago and samolus they attributed efficacies almost divine, and ordained their collection and administration with the most complicated ceremonies. For instance, the mistletoe must be cut only with a golden knife, must be gathered when the moon was six days old, the priest must be clothed in white, the plant received on a white napkin, and lastly two white bulls were to be sacrificed, and, thus consecrated, mistletoe was an antidote to poison and prevented sterility.

The vervain (of whose identity we are by no means certain, and which is probably not the plant now called by that name) was to be gathered at the rising of the Dog Star, when neither sun nor moon shone, with the left hand only, after describing a circle round the plant, etc., and, thus prepared, it vanquished fevers and other distempers, was an antidote to the bite of serpents, and a charm to conciliate friendship.

The selago was not to be cut with iron nor touched with the naked hand, but with the sagum, the Druid clothed in white, and with naked feet. Thus collected and consecrated, it became a remedy for diseased eyes and a charm against misfortune. The identity of this plant, again, is almost impossible. Pliny only says it is like the savin. Most authors agree in considering it a species of club-moss. Cesalpini considered it to be a sedum and Guilandinus an erica. The knowledge of the medicinal properties of plants was evidently considered as a highly valuable attainment many ages before the plants themselves were made the objects of a distinct science. Botany was only the handmaid of medicine. The balm of Gilead bore a high price in the estimation of the Jew, because of its healing power. In Homer, Patroclus staunches the bleeding wound of Eurypylus with the juice of a bitter root, the virtues of which he had learned from Achilles, and Achilles from Chiron. The power of the moly used as an internal antidote against the incantations of witchcraft is likewise celebrated by the same poet, and the knowledge of it is said to have been owing to the intervention of a god. Considerable *kudos* was evidently obtained by a knowledge of plant properties in the heroic age, as is proved by the encomiums given to the wife of one of the heroes whom Nestor boasts of having slain in his youth, "Who knew the virtues of each earth-born herb."

Even at a much later period we shall search in vain for any information respecting the botany of the ancients, except in their medical writers. Hippocrates, who figures on our diploma the oldest of those who have left any remains, flourished at the beginning of the Peloponnesian war, but he only mentions the plants which were employed in the cure of diseases. The names alone are given with the supposed properties. Aristotle, who lived about 50 years later, and whose comprehensive genius left scarcely anything unexplored, could not overlook such a tempting subject, but the two books on this subject now existing which

bear his name are probably spurious, as they are of such inferior merit. Theophrastus, the disciple of Aristotle, is the first professed writer on plants whose works have incontestably descended to these times. He was acquainted with about 500 species, and has left descriptions of them, with slight philosophical sketches, relating to some of their most prominent distinctions. His descriptions are very vague and imperfect, and in most cases it is difficult, in many impossible, to determine what plant he intended. He has made some rude attempts to divide them into grand families, either by their size and texture, as trees, shrubs, and herbaceous plants, or by the uses to which they were commonly applied.

From the age of Theophrastus to that of Dioscorides and Pliny there is an interval of 400 years. Dioscorides was a physician and wrote entirely as such. He has enumerated between 600 and 700 plants. A priceless copy of the figures of plants in Dioscorides is contained in the Oxford Botanical Garden Library. The figures are rude in the extreme, and his descriptions of them are so brief and indeterminate as to render them of slight value in a botanical point of view. Nor in this respect is Pliny entitled to much greater praise.

On the decline of Greece and Rome, and during that time when the Saxons were establishing themselves in Britain, medical knowledge passed into the hands of the Saracens, Bagdad under the Eastern Caliphs became the seat of learning, and the doctrines of Aristotle, Galen and Dioscorides were studied in the Universities of Cordova and of Granada, at that time enormous cities and centres of Moorish civilization and commerce. To the Arabians and Persians we owe the senna, cassia fistula, manna, tamarinds, rhubarb. Avicenna had coloured drawings for the instruction of his pupils in botany. A MS. of the Arabian School is contained in the Escorial in Spain, which was written by Ebn Berthar, a protégé of Saladin. He died in 1284. Herbelot tells us he was called Aschard, or the Botanist. One of our earliest writers after the Conquest was the historian Henry, Archdeacon of Huntingdon, in the time of Stephen. He left a MS., no. 6353 in the Bodley collection, 'De Herbis de Aromatibus et de Gemmis.' MSS. of a nearly similar date are contained in the British Museum and several others in the Bodlein Library. 'Alphita,' a medico-botanical glossary M.S. in the Bodleian, dated about 1465, has recently been printed under the editorship of J. L. Mowat, and is an extremely interesting publication.

With the invention of printing came the publication of the 'Patres Botanici,' that of Pliny, being printed at Savona in 1468, Dioscorides at Cologne in 1478, Theophrastus at Venice about 1480. The restoration of these sages of antiquity immediately raised up a numerous set of commentators. Every plant was sought for, and every plant was discovered in the works of antiquity. No drug used in medicine was deemed true unless found in Dioscorides. The lovers of botany, buoyed up by vain expectations, devoted themselves to the study of these works and wasted much time in endeavouring to find on the west side of the Adriatic all the plants which had been found by the Greeks on the eastern side of that sea. So commentator succeeded commentator, conjecture superseded conjecture, till at length a few intelligent minds, weary of fruitless attempts, perceived the folly of studying a science in the imperfect remains of two dead languages, when they might have free access to the book of nature. Conrad Gesner in particular, the greatest naturalist whom the world had seen since the days of Aristotle, cultivated both zoology and botany with a zeal rarely equalled, and with a discernment and good sense which, till then, had never been known. He has the glory of dividing plants into classes, genera and species and the necessity of taking the distinguishing character of each division from the fruit and seed. He died in 1565.

Clusius or, more properly, De L'Ecluse, born at Arras in the French Netherlands, 1521, who was his contemporary and many years his survivor, engaged in the study of plants with equal ardour but not with equal talents for just arrangement. He distributed them chiefly according to their size, their general habit and their other sensible qualities. He visited Spain, Portugal and England, and while in this country recorded one or two plants from Berkshire. The cherry laurel and the horse chestnut we owe to him, he having had the seeds from Constantinople in 1576. His chief works are 'Rariorum Aliquot Stirpium per Hispanias Observatarum Historia,' 1576, with 220 woodcuts, and 'Rariorum Aliquot Stirpium per Pannoniam Austriam, etc.,' 1583, with 350 woodcuts. The foregoing were republished in 1601 under the title of 'Rariorum Plantarum Historia.'

At this time flourished the father of British Botany, William Turner, who was born at Morpeth about the end of the fifteenth century. He was educated at Cambridge and says, while he was yet a student of Pembroke Hall, "whereas I could learne never one Greke, neither Latin nor English name even amongst the physicians of any herbe or tree, such was the ignorance of that time, and as yet there was no English Herbal but one full of unlearned cacographies and falsely naming of herbes." His first botanical work was a small tract of twenty pages, which contains the earliest printed records of any English plants. It was printed in 1538 and called 'Libellus de Re Herbaria Novus.' He embraced Protestantism and published and preached in support of it; for this he was obliged to leave Cambridge, was imprisoned and afterwards exiled to Germany, where botany became his consolation. He says in his 'Names of Herbes,' which he published in 1548, "that clinopodium groweth plentifully about Bon, by the Rheine, and I heare also it groweth about Oxford." On the accession of Edward VI. he returned to England, was made Prebend of York and Canon of Windsor, and eventually Dean of Wells and Member of Parliament. In 1551 he published the 'New Herball,' part I. On the accession of Mary he was again banished, so parts II. and III. were published in Cologne. Elizabeth restored his preferments, and to her he dedicated the 'New Herball,' the three parts in one, published in 1568. While much credit is due to Turner for his diligence in examining and judgment in discriminating different species, yet in classification he is far inferior to Clusius, for he has simply adopted an alphabetical arrangement. The 'New Herball' is in the black letter, and has many woodcuts (502 in number), said to be the same as those in Fuchs' 'Stirpium.'

Lyte (1578) describes 1050 species, of which 870 are figured, the blocks being probably the same as those employed by Clusius, in themselves copies of Fuchs'. The arrangement was very superior to that of Turner.

In 1570, Lobelius published his 'Adversaria,' in which there is the first sketch, rude as it is, of a natural method of arrangement, which, however, extends no farther than throwing the plants into large tribes, families, or orders, according to the external appearance or habit of the ample plant or flower; the whole forms 44 tribes. At the head he prefixes a synoptical view of all the species to be described under it. He then gives the Greek or Latin name, and, wherever he can, the name of the genus and species in German, French, Dutch and English. Then the plant's description, the time of flowering, the country in which it is indigenous, and in England he gives the precise spot where some of the rarer ones are to be found. In 1576 he published his 'Observationes' with 1486 figures. His name is perpetuated in our Lobelia.

This was followed in 1599 by Gerarde's 'Herbale.' Here the grasses, grain, rushes, reeds, flags, bulbous-rooted plants, are placed together, an arrangement suggested, however, not by a regard to the monocotyledenous character of the seeds, but to the simple and general form of the leaves. In the second part are included all herbs used for food, for medicine, or for their beauty and elegance. The third is a motley assemblage of trees, shrubs, fruit trees, resins, gums, roses, heaths, mosses, fungi and algæ. Cesalpini carried out Gesner's idea, and formed a natural arrangement of the whole vegetable kingdom into a regular system. He also was the first writer who has distinctly mentioned the true difference of sexes in plants. You will remember he is commemorated in the sub-order of the Leguminosæ, the Cæsalpiniæ.

Johann and Kaspar Bauhin, two brothers, are the next to notice; the elder added but little to our knowledge, but the junior, in his 'Pinax,' published 1623, made a new era in botany, as it showed at one view the information which had been given by a multitude of scattered authors. Pona and Zanoni, in Italy, Johnson and Parkinson, in England, Hernandez, Piso and Marcgrave, in South America, found many new plants, who in his 'Hortus Malabaricus,' brought to light about 800 plants from the East Indies. But it was reserved for the golden age, when in different lands, but nearly contemporaneously Morison, the immortal Ray, Rivinus, and Tournefort, directed their attention to plant classification. Morison, in 1669, in the 'Hortus Blesensis,' and later, in 1680, in the 'Historia Oxoniensis,' gave the rudiments of an arrangement founded on the fruit, and also asserted that the characters of the genera should be taken from the same quarter. This system was soon superseded by that of Ray, the outlines of which were first given in 1682 in the 'Methodus Plantarum,' the principle aim of this great naturalist being to preserve the natural families of plants, as they are connected by a similarity of fructification and general habit. Influenced by the latter consideration, he retained the ancient division of the vegetable kingdom into trees, shrubs and herbaceous plants, making no alteration, except in classing with the latter what are generally called suffruticose, or under shrubs. This system he afterwards improved and brought nearer to a natural arrangement, but he still left the characters of his genera in a great degree indeterminate and governed by no fixed principle. In the year 1686 he published his 'Historia Plantarum.' Altogether he described 6906 species. In 1688 appeared his 'Fasciculus Stirpium,' and in 1690 his 'Synopsis,' which was really the first practical flora of Great Britain.

Rivinus, in 1690, published a classification derived from the structure of the corolla. He first saw the impropriety of separating trees from herbaceous plants. As Morison yielded to Ray, so Rivinus gave way to Tournefort, the glory of France. His elements of botany, in which the primary divisions are taken from the corolla and the secondary ones from the fruit, were published in 1694. The distinction of sexual parts in plants, as I have said, had been discovered, and pretty generally admitted; but it was Carl Lind, or as we are accustomed to say, Linnæus, the Swede, who first made it the basis of an artificial system. The first sketch of his 'Systema Natura' was published in 1735, and the 'Fundamenta Botanica' in 1736. In 1737 they were followed by 'Critica Botanica,' 'Genera Plantarum,' 'Hortus Cliffortianus,' 'Flora Lapponica' and 'Methodus Sexualis.' In 1751 he published his 'Philosophia Botanica.'

1753 marked a new era in botanical literature, the introduction of the binomial nomenclature by Linnæus in the 'Species Plantarum.' In the 'Genera Plantarum' he gave greater distinctness and precision to generic characters than they had before received. In this 'Species Plantarum' he conferred the same obligation on the species, with the addition of the trivial names, consisting of a single word instead of the tedious specific names, as they were called, with which botanical literature had previously been burdened and embarrassed. This innovation was violently condemned at first by disciples of the old schools, including Dillenius, our own Oxford professor, but during a visit paid by Linnæus to Oxford the opposition in this particular case became much modified. The binomial system soon became generally adopted. His artificial system of arrangement, based upon the sexes of plants, held its position for some time and had much in it to commend itself, especially to students, but being opposed to nature various botanists began to work at forming a more natural arrangement, amongst whom may be named Bernard Jussieu, Adanson, Gleditsch, Crantz, Lamarck, Gaertner, Mœnch, Thunberg, Gmelin, and Willdenow, and more especially to Antoine Laurent de Jussieu, whose system is based first upon the number of cotyledons in the seed, hence the classes Dicotyledon and Monocotyledon; the insertion of the stamens, whether immediately on the receptacle—on the calyx—on the pistil itself, or mediately by the means of the corolla similarly situated, and so on, from the essential to the non-essential—from the more to the less important parts.

Antoine Laurent de Jussieu's system was first published in 1774. Under fifteen classes Jussieu arranged 100 natural orders.

Augustin Pyramus de Candolle first promulgated a system in 1813 which, modified, forms the basis of the system at present adopted, and with which you are necessarily familiar.

(*To be concluded.*)

Provincial Transactions.

BRISTOL PHARMACEUTICAL ASSOCIATION.

A meeting was held on Friday, December 20, at the University College, Bristol, Mr. J. W. White, President in the chair. After other business, it was moved by Mr. Keen, seconded by Mr. Pitchford, and carried unanimously, "That this meeting disapproves the action of the Council of the Pharmaceutical Society of Great Britain in prosecuting the assistant of a registered pharmacist for the sale of Battle's vermin-killer, and considers that action to be contrary both to the letter and spirit of the Pharmacy Act, 1868."

It was moved by Mr. Stroud, seconded by Mr. John, and carried unanimously, "That this meeting would deeply regret the matter being left in its present imperfectly defined position, and suggests that an effort be made by the pharmacists of the locality to raise a fund in support of the expenses of the appeal."

The following sums are promised on the understanding that the appeal is pursued:—Mr. White, £1 1*s.*; Mr. Towerzey, £1 1*s.*; Mr. Schacht, £2 2*s.*; Mr. Stroud, 10*s.* 6*d.*; Mr. Keen, 10*s.* 6*d.*; Mr. Pitchford, 10*s.* 6*d.*; Mr. John, 10*s.* 6*d.*; Mr. Pitman, £1 1*s.*; Mr. Isaac, 10*s.* 6*d.*; Mr. Troake, 10*s.* 6*d.*; Mr. Turner, 10*s.* 6*d.*; Mr. Townsend, £1 1*s.*

Further contributions will be announced as they are promised.

SHEFFIELD PHARMACEUTICAL AND CHEMICAL SOCIETY.

The following paper was read at the "Students' Night," of the above Association, held on the 11th inst.:—

Pills and their Excipients.

BY A. S. SMITH.

The subject I have chosen is, I venture to say, a very important one to students. It is a subject about

which much has been written, and ever likely to be, so long as it plays such an important part in our qualification. The difficulties to be met with in "pill making" are only too numerous, and seem to be ever on the increase, for such is the confidence of the medical fraternity in the pharmacist of to-day, that they seem to think anything can be made into a pilular form, and when they have written "Fiat pil." at the end of their prescription they have done all and done it well, and expect the chemist to do his part equally well.

I will now venture to say what a well made pill should be. It should be spherical, of sufficient firmness as will ensure it keeping that shape, but not so hard that its solubility, or rather disintegration might be questioned, and, lastly, its ingredients should be thoroughly incorporated with each other, and in such a manner that their efficacy is not in any way injured.

The choosing of the excipient is, of course, the most important part of the dispenser's art. His chief guidance must be a strict observation of results obtained, for while not attempting to in any way undervalue the information to be obtained from a careful study of the long list of excipients to be found in most text books, yet it must be remembered that nothing teaches like experience. What dispenser, indeed, has not his own particular hobby? and does not pin his faith on some special excipients. I may say I have not hunted up all the out of the way substances and difficult recipes I could lay hold of, but have contented myself by endeavouring to deal with some of those which may be met with from time to time in most establishments.

I will firstly touch on some excipients I have tried, and the results obtained. Of course the simplest excipient is undoubtedly the best. For masses which contain a large proportion of vegetable powder (as in the case of pil. morph. gr. ¼, which is to be made up with some inert vegetable powder). I have found nothing better than simple syrup with a few grains of pulv. tragacanthæ. Of course the tragacanth is to be added after the mass is made.

Glycerine, on account of its property of keeping many pills soft is much used; it is very treacherous, however, and must not be used in masses which contain iron, as it makes such masses very brittle and crumbly.

Glycerine and tragacanth, in the form of Proctor's paste (which contains a greater proportion of water than the official), is very useful and makes better masses of metallic salts than syrup and tragacanth. In most other cases, however, I have got better results and in less time with syrup, etc.

For the benefit of those amongst you who have not yet tried it, and would care to do so, the following is the recipe:—

Pulv. tragacanth	℥i.
Glycerine	℥iii.
Water	℥i.

Extract of malt is an excipient which I cannot but think has only to be better known in order to be more generally used; it has given excellent results in most masses containing iron. I have here a mass composed of ferri redact gr. 24 and quin. sulph. gr. 12. It was massed with extract of malt a fortnight ago and is still in a good condition, a result with difficulty obtained with any other simple excipient. I have also a mass of quin. sulph. alone, which was made at the same time. It is in a splendid condition and was massed with the same excipient, which is preferable to confection of roses, on account of the bulkiness of the latter, and is superior to tartaric acid for therapeutic reasons. While I am speaking of extract of malt I may say I have noticed that the following B.P. pill masses, viz.: Pil. ferri carb., pil. coloc. co., pil. aloes et ferri, pil. aloes et myrrhæ and pil. aloes et asafætidæ, all get extremely hard after being kept some time. I have substituted extract of malt for the official excipient in the three following: pil. ferri carb., pil. coloc. co. and pil. aloes et ferri. They have now been made more than a week and I invite your attention to their present condition. I have no doubt that equally good result could be obtained in all the cases named.

Soap powder, as you all know, has its special purposes. In the case of creasote pills I have found the powdered animal soap far superior. I have here a mass made by digesting at a gentle heat, in a wide mouthed bottle, by means of a water bath, equal parts of animal soap and creasote until thoroughly mixed, and after allowing to cool massed by the addition of 1½ grain of powdered liquorice to every minim of creasote. Yellow wax is much used for this mass, but is too indigestible. Bread crumb has deservedly gone out of favour for this mass.

I have found the compound decoction of aloes an excellent excipient for pills containing a large quantity of aloes; a very small quantity suffices, and it gives a splendid polish to pills, thus dispensing with powder. Incompatibility should, of course, be guarded against. Canada balsam makes good pills with deliquescent salts, such as potassium acetate, potassium citrate and calcium chloride; it is also useful for benzoic acid. Pills thus made should be coated with varnish, and if meant to be kept must be kept in a stoppered bottle.

Calcii phosph. and magnes. calc. are very useful on account of their drying properties. They may be used in conjunction with cera flav. in small quantities in pills containing much oil. In using them plenty of time must be given and magnes. calc. is very liable to make pills insoluble.

I must now leave this part of my subject, and will proceed to treat of a few substances which may occasion some little trouble when met with, and which have not been touched upon while speaking of excipients.

Butyl chloral hydrate is best managed with a thick mucilage. It may not be out of place here to say that one of the greatest drawbacks of this excipient is its acidity.

Burgundy pitch can be made into a good mass with pulv. tragacanthæ co.; it is here that the hot plate comes into requisition, by the aid of which it is easily manipulated.

Carbolic acid is not, at any rate, the most pleasant substance to make into pills; many things have been recommended, such as soap, wheat, flour, marsh mallow powder, etc. I have here a mass which leaves nothing to be desired, prepared according to the following formula:—

℞ Carbolic acid crystals . . .	gr. iss.
Pulv. glycyrrh. decort. . . .	gr. iv.
Mucilage of acacia	q.s. Fiat. pil. i.

Croton oil, owing to its small dose, can be treated with success in the same way.

Tannic and gallic acids can be massed with thick mucilage: the addition of a little glycerine to keep them soft will be found very serviceable.

Camphor makes a satisfactory mass with a small quantity of soap, say 1 grain to every 6, and massed with either simple syrup and tragacanth, or Proctor's paste, if intended to be kept any time. I think the latter is preferable, *i.e.*, if the size will permit its use.

Chloride of calcium being so deliquescent is exceedingly troublesome. I have here some pills containing 3 grains of that substance; they were made by the addition of ½ a grain of resin to each and massed with Canada balsam. They have been varnished and have kept their shape perfectly.

Potassium permanganate is another troublesome substance to deal with. I have some pills here containing 3 grains made with the addition of ½ a grain of pulv. resinæ and powdered fuller's earth 1 grain, and

massed with vaseline; they are much firmer than if made with ung. resinæ alone. Kaolin ointment makes a good mass, but is not always handy at the dispensing counter.

The bulkiness of most scale preparations can be greatly reduced by the addition of a few drops of water, and may be massed with pulv. tragacanthæ co. and simple syrup.

Soluble crystalline salts, such as potassii iodid. and potassii bromid. must be treated with aqua destill. in order to lose their crystalline form; they can then be massed with pulv. glycyrrh. and simple syrup with tragacanth, as in the following:—

℞ Potassii iodid.	℥ss.
Aquæ dest.	min. iv.
Pulv. glycyrrh.	gr. x.
Syrup. et tragacanthæ	q. s.

Essential oils are a class upon which no fixed rule can be laid down; it is here more particularly where good judgment is of the greatest value in the choosing of an excipient. Soap is useful, but the question of incompatibility must not be overlooked.

Cera flava for coloured, and cera alba for colourless oils, are very useful, but should be used sparingly; in fact we should do well to remember to avoid their use where possible. Liq. potassæ, with all its drawbacks, is a very good friend in those cases where there is a superabundance of oil to be combined with an extract or resinous ingredients. A drop or two will sometimes work wonders.

I have here some pills made from the following receipe, which I had to negotiate during last week:—

℞ Zinci valerian..	36 gr.
Creasoti	18 gr.
Pil. asafœtid. co.	36 gr.
Pulv. rhei.	18 gr.
Pulv. camph.	18 gr.

Ft. mas. divid. in pil. 36.

As will be seen each pill contains half a minim of creasote and one grain of zinci valerian, besides the camphor, none of which are particularly nice things to manage. I took care of the creasote by mixing it with an equal quantity of pulv. sapo animalis in a warm mortar; I then rubbed down the camphor in another mortar and mixed it with the pulv. rhei and zinci valerian., after adding it to the soap and creasote, and by using an equivalent quantity of pulv. for pil. asafœtidæ co. I got a splendid mass by the final addition of half a grain of calcii phosphas.

I will conclude my remarks with a few words on those cases where a potent remedy is to be administered. An intimate mixing and perfect combination is here of the greatest importance; this end is best acquired by presenting the drug in the form of a solution. In these particular cases glycerine is especially useful, for instance by its means hyd. bichlor. and strychnia may be first dissolved and massed with some inert vegetable powder. I think it is now generally admitted that such pills should be made up to the size of 1 grain.

LIVERPOOL PHARMACEUTICAL STUDENTS' SOCIETY.

The fifth meeting of the session was held on Thursday, the 12th inst., in the Society's Rooms, Colquitt Street, when a paper was read by the President, Mr. H. Wyatt, Ph. Ch., entitled—

Dry Reactions of Simple Salts.

BY H. WYATT.

The author stated in commencement that the selection of this subject for a paper had been decided by the scant attention pharmaceutical students generally bestow upon this most important branch of chemical analysis. He was sorry to have occasion to make such a sweeping assertion, but his experience led him to the conclusion that the generality of students looked upon analysis in the dry way as a dry subject, and scamped it accordingly, or at the most performed it in anything but a systematic manner. This was a state of affairs to be deplored, and one which would not long exist if students would only take the trouble to follow some definite course systematically; such an one as might be found in any text-book of repute.

After remarking upon the excellent results obtained by an intelligent use of the blow-pipe in the hands an honest and conscientious worker, the author gave an outline of the scheme generally followed, which consisted, he remarked, of three stages:—

1. Heating a little of the substance in a hard glass tube, and observing any fumes, sublimate, or peculiar coloration.

2. Heating before the blow-pipe on carbon in both the oxidizing and reducing flame, in the latter case with the addition of sodic carbonate or potassic cyanide; taking notice of the manner in which the salt behaves, whether it deflagrates or sublimes, leaving no residue, or leaves a white or coloured residue or a metallic bead. In the latter case observe if the bead be bright or covered with oxide.

3. Observing the colour a Bunsen flame acquires when a little of the salt, taken up on a platinum wire moistened with hydrochloric acid, is placed in it.

Taking these stages *seriatim*, in the second stage, after heating a salt on carbon in the oxidizing flame, if a white residue was left, the mode of procedure was to add a drop of cobaltic nitrate solution and heat again under the blowpipe, when a green mass indicated a zinc salt, a blue aluminium, and a pink magnesium.

Silicates, the author said, sometimes gave a blue colour like aluminium salts if over-heated, but might be distinguished by the mass appearing fused.

When a coloured mass resulted, a little of the salt was taken up on a borax bead, and heated first in the oxidizing and then in the reducing flame, when according to the colour produced the metal in the salt could be ascertained.

There was considerable difficulty in getting these bead reactions, as so much depended upon the worker's ability to produce a sustained blowpipe flame of the required variety, practice in this particular being most essential before anything like certain results could be hoped for. The difficulties of this portion were much increased by the want of uniformity among writers on the blowpipe as to what is to be understood by an oxidizing and a reducing flame, students, after reading two or three authorities, each giving a different definition, being as it were between the proverbial two stools.

The third stage, examination of the flame-colouring properties of salts, was rather a favourite with students, and in the case of simple salts offered few difficulties, the detection of potassium being the only one commonly occurring. For observing this the cobalt glass usually sold is next to useless if more than slight traces of sodium salts are present; three pieces of glass placed one over the other were not at all too deep a blue in such a case. The best method to absorb the sodium flame was undoubtedly to view it through a hollow-glass prism filled with indigo solution, but as this piece of apparatus is somewhat expensive the author said he had seen the suggestion somewhere that a flat bottle of permanganate solution, or better, aniline could be used as a substitute. This he had adopted with good results, using an ordinary flask with flattened sides, containing aniline blue dissolved in glycerine and water of such a strength that an ordinary luminous gas flame could just be distinguished through it. By means of this potassium could be

easily recognized by its flame, even when mixed with both sodium and lithium.

Another point to be remembered was that although cupric salts generally give a green flame cupric chloride gives a beautiful bright blue.

Turning next to the acidulous side of salts he mentioned the fact that many marked reactions could be observed during the pyrological examination, both with salts of organic acids and of inorganic acids, as instances noting the decomposition of acetates, oxalates and tartrates, and the deoxidizing effect of carbon on sulphates by which a sulphide is formed which evolves H_2S on addition of a dilute acid. A similar case to this latter was the test for phosphates, consisting in heating with an alkali and metallic sodium or magnesium, when PH_3 is given off on addition of water.

Besides inorganic salts, many alkaloids and organic bodies could be detected by the dry method, quinine and cinchona alkaloids exhibiting a most characteristic purplish sublimate of an oily nature if heated in an oily tube. Among scaled preparations, too, beberinæ sulph., by its peculiar burnt meat odour when heated, could not be mistaken for any other salt; and coming to more recent introductions into medicine, sulphonal, when heated with cyanide of potassium or pyrogallol, gave off fumes of mercaptan or some allied body of decidedly alliaceous odour. These reactions were mentioned, the author said in conclusion, to emphasize the general applicability of systematically conducted examination by the dry method.

Mr. Johnson thanked the President for his paper, which he was sure would convey many valuable hints to those present. He had always depended largely upon results obtained from a systematic use of preliminary tests and with considerable advantage. With regard to the difficulty encountered in obtaining the amethyst colour characteristic of a manganese salt in the borax bead, he had been recommended a bead fused from a mixture of carbonate of soda and nitre, which gave a most characteristic green with the minutest trace of a manganese salt. He looked upon this as a most delicate test for manganese. He had also found an excellent indication of a nitrate was obtained by reducing the salt under examination by fusion, and afterwards testing for a nitrite with iodide of potassium and starch paste in the usual way. He had also found that much help was obtained by using as an additional preliminary test a concentrated solution of a caustic alkali, since on heating some of the salt with a small quantity of the solution, not only was ammonium directly revealed, but frequently metals often present as very insoluble salts were betrayed through reductions to their lower oxides and hydrates. In conclusion, he was sure that a little attention paid to a few dry reactions often saved a considerable amount of trouble and annoyance.

Mr. Shaw also impressed upon students the importance of preliminary analysis, and advocated the use of the blow-pipe to obtain the characteristic colour reactions of some of the more stable salts of metals, as they were not readily attacked by HCl, *e.g.*, $BaSO_4$, $SrSO_4$, etc., etc. He also mentioned a test for ammonium which was very useful. Where only a trace was present put a little of the substance moistened with lime into a watch glass and fix on the inside of another a little red litmus paper; place the two glasses together and warm over a Bunsen flame. If ammonia be present the paper will, of course, be turned blue.

Mr. Mitchell also spoke of the importance of preliminary analysis, and said it had served him well in the examination room.

The next meeting will be held on Thursday, January 9, when a paper will be read by Mr. Wokes, Pharmaceutical Chemist.

DUNDEE CHEMISTS' ASSISTANTS AND APPRENTICES' ASSOCIATION.

At the eleventh meeting of the first session held on Thursday evening, December 12, Mr. Lindsay read a paper on "Infusions."

The author dealt almost exclusively with concentrated infusion making, as he said that simple infusions were almost unknown in many pharmacies. He gave in detail his experiences in the preservation of these preparations and showed several samples of concentrated infusions which he had made. The best, although at the same time the most expensive, preservative was rectified spirit. This in the proportion of about three ounces in the pint, added before the infusion got cold, was quite sufficient to preserve infusions for a considerable time, even in very warm weather. This applied particularly to infusions of buchu, calumba, gentian, and senega. Boracic acid or glycerine was suitable for many infusions, especially quassia. Infusion of calumba, he said, was one of the most difficult to make, but he had found that percolation was the method best suited for this. In concluding a very instructive paper Mr. Lindsay advocated the boiling of the water for a short time before making the infusion, as in this way it kept better.

In the discussion which followed some very interesting experiences were given, and an animated discussion took place between Messrs. Henderson and Lamont on the use of liquor potassæ in the preparation of infusion buchu and decoct. scoparia.

Mr. Henderson strongly advocated its use. He had been led to do so, through reading a paper on the subject of a deposit in decoct. scopariæ by Mr. F. H. Fisher, which was read in Edinburgh a year or two ago. His results had been most satisfactory, and he had carried them on to infusion buchu with like results. No concentrated infusions were strictly B.P., and the amount of liquor potassæ added was so small as to have practically no effect.

On the motion of the Chairman a hearty vote of thanks was accorded to Mr. Lindsay for his paper.

The next paper was on—

Pill Coating.

BY ISAAC HISLOP.

In introducing his subject Mr. Hislop said they all would admit that pills were one of the most popular and convenient of all forms of medicine, and that it was necessary once the pills were made to lessen the bitterness of the taste and make them easily swallowed.

Various methods had been tried to render them tasteless, and it was his intention to bring before them four different kinds of coating, viz., gelatine, pearl, sugar, and silvering.

Beginning with silver coating he said that for small quantities a covered pot might be used if the chemist had not a globular pill silverer. The pills must be entirely free from powder, then moistened with mucilage about two drops to each dozen of ordinary pills. Place the pills in the silver leaf and rotate until they are entirely covered. Mr. Hislop said that objections had been raised to silvering pil. hydrarg. Personally he had found no difficulty. He added a little gum tragacanth to the mass in order to harden it up. After they were thoroughly dry, silver in the same manner as any other pill.

He then treated in turn the various methods of coating. For pearl coating he used a solution of resin in sulphuric ether as a varnish (1 in 4). Then he used ordinary mucilage of acacia to take on the French chalk. For gelatine coating he used the following solution:—

Take of—

Gelatine	1 ounce
Glycerine	½ ounce
Water	8 ounces

Dissolve the gelatine by means of a water bath and when ready remove the apparatus a little distance

from the heat. The pills are stuck on the ends of needles dipped in this solution and rotated several times in the fingers and finally stuck in putty to dry. For sugar coating he recommended Dr. Symes's method as all that could be desired. In concluding an interesting paper Mr. Hislop said that many chemists objected to coated pills because they took longer to act, but upon that point he must disagree with them, as there was always a certain amount of heat between the coating and the pill which kept it soft.

An interesting exchange of opinion followed this paper and a hearty vote of thanks was accorded to Mr. Hislop for the excellent way he had treated the subject.

The Chairman then called on Mr. S. C. Henderson to read the last paper, which was entitled—

IMPROVED FORMULA FOR—(*a*) LOTIO HYDRARGYRI NIG.; (*b*) LOTIO PLUMBI C. OPIO.

BY T. C. HENDERSON, ROYAL INFIRMARY.

Lotio Hydrargyri Nig.

The only apology I have to offer for placing this formula before you to-night is that I was led to do so after reading a letter which appeared in the correspondence column of the *Chemist and Druggist* of Nov. 30, 1889.

In this letter the writer (Mr. T. A. Heale, of Holloway, London, N.) described a change which he had observed in his stock of lotio hydrarg. nig. This change has probably not been noticed by many of the members present, due doubtless to the fact that most pharmacists prepare their "black wash" just as it is required, and once dispensed they have no further opportunity of observing its appearance and noting any change which may take place. However, as might be imagined, this preparation is largely used in hospital practice, and hence I have always a stock on hand. Previous to adopting my present method some year ago I frequently observed the change mentioned by Mr. Heale.

The main reason attributed for this change is the oxidation of the mercurous oxide into the mercuric oxide. Accepting this as correct, the point for us is to prevent, if possible, this oxidation, and this can effectually be done by the introduction of a small quantity of glycerine, proceeding thus:—

Take of—

Calomel	60 grains
Glycerine	℥i.
Lime water	q. s.

Rub up the calomel with the glycerine in a mortar, transfer the mixture to a bottle, add 4 ounces of lime water and shake well, then add sufficient lime water to produce 1 pint. Made thus the Hg_2O is in a much finer state of sub-division, shakes up more readily and keeps any length of time without change, while the product is more elegant in appearance than the B.P. preparation.

For those who use large quantities, the calomel and glycerine may be kept readily mixed (℥j. of calomel in ℥j. of glycerine) and the requisite quantity taken and lime water added as required.

Lotio Plumbi c. Opio.

Although not an official, yet this is a largely used lotion, and various formulæ for its preparation are followed. In our Hospital Pharmacopœia it read thus—

Take—

Solution of subacetate of lead	1 fl. oz.
Tincture of opium	1 fl. oz.
Water to	1 pint.

Mix.

Made according to the above formula the product has a muddy appearance, is of a dirty brownish grey colour, soon separates and thickly coats the sides of the bottle in which it is dispensed. After several attempts to improve the appearance of this I selected the following:—

Solution of subacetate of lead	℥j.
Glycerine	℥j.
Tincture of opium	℥j.
Water to	1 pint.

Dilute the tincture of opium with 15 or 16 ounces of water. Mix the lead and glycerine together, add these, and finally make up to 20 ounces with water. The result of this modification is that you obtain a quite transparent lotion which does not separate, and is certainly much more presentable than the former, and thus should find favour in the eyes of all who advocate elegance in dispensing.

A short discussion followed the reading of this paper, and Mr. Henderson was thanked for his notes. As it was late the reading of the apprentices' prize essays was left over until another night.

The twelfth meeting of the session was held on Thursday evening, December 19, the Vice-President in the chair. There was a large attendance.

After the minutes had been read and some other business transacted, the Chairman called on Mr. W. McKay to read his paper on "Medicine in Shakespeare."

On the conclusion of a very elaborate and carefully written paper a hearty vote of thanks was accorded to Mr. McKay on the motion of the Secretary, and supported by several members.

The first Annual Assembly in connection with the Association took place in Speed's Hall on Wednesday evening, December 18. There was a fair turn out of chemists' assistants and their lady friends, and a most enjoyable evening was spent. Mr. Isaac Hislop acted as M.C. in an able manner.

Reviews.

LECTURES ON MASSAGE AND ELECTRICITY IN THE TREATMENT OF DISEASES (Masso-Electro-Therapeutics). By THOMAS STRETCH DOWSE, M.D., F.R.C.P., Ed.*

Fifteen lectures on the therapeutic value of massage and electricity are brought together in this book. It is customary, we believe, in publishing lectures, for the author to indicate in some way or other the status and character of his audience, a point of some value in estimating truly the *raison d'etre* of the lectures, but unfortunately information in this direction is not forthcoming. The book is dedicated to Dr. Weir Mitchell, a name familiar to many in connection with the successful treatment of obscure neuroses.

Dr. Dowse in the preface hopes that "his worst enemies will see no reason to insinuate that they have been produced from any other than purely professional motives." His plea for the appearance of the work consists in the fact that "he has endeavoured to deal with the problems involved in a spirit of scientific inquiry and research," but we venture to say that any work appearing on these premises needs no apology such as is tendered in the preface.

Massage is defined as "consisting of a series of movements classified and arranged so as to produce certain definite well-known physiological effects; and its combination with the induced current passed through the body of the masseur adds greatly to its value."

One matter is alluded to in the introduction which entirely claims our active sympathy. The dearth of teaching in physiological physics in the medical curriculum is much lamented. As a case in point the preliminary scientific examination of the University of London is brought forward. Here Dr. Dowse remarks that in order to obtain correct information of the natural laws governing the use of the stethoscope, ophthalmoscope and microscope, it is necessary to wade through interminable problems on the C. G. S. system of units or vortex theories of matter, etc. All

* Bristol: John Wright and Co. London: Hamilton, Adams and Co., Paternoster Row. 8vo., pp. 379.

readers of the work who have passed this trying, and to a large extent time-wasting, ordeal will cordially endorse Dr. Dowse's remarks.

In the first lecture mechanical principles generally are treated of, leading on to a consideration of those involved in massage particularly, with the physiological effects produced, these latter consisting fundamentally in the conversion of potential into kinetic energy. The second lecture appears to us more valuable than any of the others, since the methods of massage are clearly described and much assistance is gained in the understanding of the text by the insertion of copious diagrams. "Effleurage," "petrissage" and "tapotement," are well defined and their distinctive value and application are indicated.

Since massage finds its chief, but by no means sole, application in the therapeutics of diseases of the nervous system, a considerable portion of the text is devoted to this branch of medicine. Neuralgias, peripheral neuritis, infantile paralysis are all benefited by massage combined with electricity, and "may even be cured if cases are seen soon enough." We are glad to note that Dr. Dowse has been eminently successful in the treatment of varieties of myxœdema, and his success contrasts remarkably with the entirely negative results which followed all other kinds of treatment in 109 cases, tabulated in the last edition of the Clinical Society's 'Transactions.' It may be that the author's clinical experience and acumen in the recognition of the "varieties of myxœdema" have contributed not a little to his success.

Lecture VII. is devoted to a careful *résumé* of the Weir-Mitchell treatment for hysteria, and it teems with practical hints and observations, which only those who have had such cases under their care will be able fully to appreciate. Great stress is laid upon absolute rest, entire seclusion from sympathetic friends and relatives, and careful dieting.

Lecture IX. treats of neurasthenia, railway spine and hystero-epilepsy, and we are indebted to the author for a new term, "railway-brain," which is defined by him as the "supervention of psychical disturbance and commotion following a shake up in a railway accident." In the treatment of orthopædic affections the mode of treatment under review naturally takes a prominent position, and we are indebted to the author for his abstract from the admirable post-graduate lecture given by Mr. Barwell, dealing with the clinical examination of lateral curvature of the spine.

According to the author massage has not been sufficiently used in the treatment of functional disturbances and diseases of the abdominal viscera, and some cases of constipation and intestinal obstruction are benefited by it; but it is naturally of no avail if the obstruction arise from new growth. Of doubtful value we think is the use of the electric-compress in constipation. Patients so affected are too apt to pass a large part of their waking hours in a constant condition of introspecting their own viscera, and not infrequently this state of mind is the portal to confirmed and incurable hypochondriasis. It would be certainly more to the interests of a patient so afflicted to advise him or her not to submit to massage, which after all is but passive exercise, but rather to shake off the lethargy of egotism by well regulated active exercise, such as walking, riding, cycling.

The author's remarks on massage of the uterus are by no means sufficiently decisive when he discusses the subject with the remark "it is not thought to be necessary otherwise than in exceptional cases." When it is remembered that uterine massage practically consists in repeated and prolonged bimanual examinations of the uterus and vagina, and that one of its earliest and most pronounced exponents advised only those to practise it "who have clean hands and a pure heart," surely such a practice needs the most stringent safeguards, if, as we most vigorously doubt, it ought to be practised at all.

Lectures XIV. and XV. treat of the difficult subject of the application of electricity to medicine, and are models of concise writing. We wish that the same could be said of the book as a whole, and that the author had not been tempted to stray from the path indicated by him in the preface of "setting forth his results in a plain, simple, ungarnished statement of facts." It appeared to us that while Dr. Stretch Dowse has in some measure succeeded in dealing with the problems involved in a spirit of scientific research, yet he has certainly erred in the matter of excessive quotation. There are whole pages standing in inverted commas, and an abundance of anecdotage and verbiage, of which the following sentence is one of the least glaring examples: "Life is the sum of antagonistic action and interaction of internal properties and external agents; the evolute potential of vitality. Death is the dissolution, the catalysis, disintegration and degeneration of evolute processes." Wherein lies the doubtless hidden meaning of this over-blown sentence? Anecdotes of the Emperor Hadrian and the doings of the Town Council at Bath are allowed to occupy half a page and two pages respectively, to the detriment of the reader. We trust that when a new edition appears much "weeding out" will have taken place and the whole subject have been placed in a more concise form.

WATTS'S MANUAL OF CHEMISTRY. Theoretical and Practical (based on Fownes's Manual). Vol. I. Physical and Inorganic Chemistry. By WILLIAM A. TILDEN, D. Sc., F.R.S., Professor of Chemistry in the Mason College.*

The well-known "Fownes," which has stood the test of so many years, and won such a high reputation, is apparently not decreasing in popularity, as is shown by the publication of a new edition, the second under its new name, the fourteenth in all. The enormous developments of chemistry, especially of organic chemistry, since the publication of the original work in 1847 have of course necessitated great expansions and additions in successive issues, and in the last edition the organic portion was separated into a distinct volume. In this new edition of the volume dealing with inorganic chemistry and chemical physics, the tendency that all books have to increase more or less in size in every successive edition, has been repressed, the present work being somewhat smaller than the last; the diminution has been obtained chiefly at the expense of the physical portion. It no longer contains a separate section devoted to physics, some of the more purely physical articles, such as descriptions of the air pump, thermometer, electrical machines, Ruhmkorff's coil, etc., being omitted, while others more intimately connected with chemistry, such as the spectroscope, crystallography, specific densities and heats, etc., are interspersed in appropriate portions of the chemical section. A beginning has also been made in the direction of introducing instructions for the performance of practical experiments in connection with many of the compounds described. These experiments are of an elementary character, but are comparatively few and scattered, and are therefore insufficient to render the book available for use as a complete guide in the practical study of the subject, although where few facilities for a regular course of experimenting exist, they will be useful as illustrating the subjects of study and making them more interesting.

With these exceptions, the previous character of the book has been preserved, its excellent illustrations and general style being the same as before, while the slower growth of inorganic as compared with organic

* London: J. and A. Churchill. Small 8vo. Pp. i.-xx., 1-544. 8*s.* 6*d.*

chemistry has rendered fewer additions and alterations necessary than might have been expected. The book now begins with a short introduction setting forth the general laws of chemical action, and then at once proceeds to the consideration of the non-metallic elements, among the descriptions of which are interpolated, as occasion arises, the paragraphs previously treated in the section of chemical physics. Thus the consideration of hydrogen leads up to that of the general properties of gases, Boyle's law, diffusion, occlusion, and the kinetic theory; oxygen gives rise to the discussion of flame, burners, safety-lamps, etc.; water to specific gravities, vapour densities, and dialysis; and most of the other physical information directly bearing on chemistry is still retained in the same way. We are pleased to see that the old dual formulæ, of the type H_2O,SO_3, often so useful in explaining the formation and decomposition of salts, have not been entirely discarded in favour of the more generally used modern formulæ, but are still frequently employed in conjunction with the others. By the judicious use sometimes of one formula, sometimes of another, a student is led to regard a compound from various points of view and see it in lights that would not otherwise strike him. By laying too much stress on the formula H_2SO_4, for instance, one is apt to fall into the error of regarding the other hydrates of SO_3, such as $H_2S_2O_7$ and H_4SO_5, as simply molecular combinations of H_2SO_4 with SO_3 and H_2O respectively, while when we write $2SO_3,H_2O$, SO_3H_2O and SO_32H_2O, their analogy to the three varieties of phosphoric acid $P_2O_5H_2O$, $P_2O_52H_2O$ and $P_2O_53H_2O$, strikes us, and we consider them as distinct acids, differing fundamentally in properties, but easily convertible one into another.

In many other respects, by regarding the facts of chemistry from various aspects and dealing with every side of the question, this will remain one of the very best books for giving a good all-round knowledge of the science.

Correspondence.

*** *No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.*

Prizes for Students.

Sir,—I note with considerable pleasure the introduction in the Council of a scheme for giving prizes and certificates to apprentices or students of the Society, and I am desirous of giving my testimony in its favour through your columns.

Most members of Council seem to recognize the fact that the Society loses touch with the youths who enter the trade from the time of their passing the Preliminary to the time when they are compelled to become candidates for the Minor, and that during this period the great majority do not undertake any systematic study. And why? Simply because, as Mr. Leigh stated, they do not feel that there is any urgency in the matter; they get through their everyday duties, and feel that for the present that is enough, and all that should be required of them.

We know how natural it is, especially in the thoughtless days of youth, to allow our conduct to be actuated by the motto "never do to-day what you can put off till to-morrow;" and so we find apprentices devoting all their leisure to pursuits apart from their business. There is really no inducement for them to study. Of course this applies principally to the youths who pass their apprentice days in small towns which have not the boon of a local association, and in which it would be impossible for one to subsist; and I take it that it is in such places the majority of apprenticeships are served. Now, sir, to alter this state of things for the better is of the highest importance, and worthy of the best energies of the Pharmaceutical Council, and any legitimate scheme which would arouse this apathy and create a desire for study should receive earnest consideration. Both masters and apprentices would be benefited; the former in that the youths would be better equipped for their daily duties, and would speedily gain a more intelligent interest in, and knowledge of their business; and the latter would feel that having adopted a systematic course of study during apprenticeship their preparation for the Minor would be all the easier; the examination would be less of a bugbear, requiring the expenditure of much less time and money.

It is needless, however, to dilate further upon this phase of the subject; but I should like to note one other point, which was referred to by Mr. Leigh, and emphasized by Mr. Harrison, and that is that some benefit would undoubtedly accrue to the Society itself. Loyalty to the Society would be fostered by it, and this is an important consideration.

It is frequently said that the Society does nothing for the trade except receive its subscriptions; that it evinces no genuine interest in its welfare. Let it be understood that I do not make this charge, nor am I endorsing it; but I hear it reiterated again and again, and the fact cannot be gainsaid that there is such a feeling abroad and to a very large extent. Now, sir, here is an opportunity for the Society to show its desire to help the trade in one of its difficulties, which would be duly recognized and appreciated. And no doubt many more youths would be induced to pass their Preliminary as early as possible, so that they might attach themselves to the Society, and be qualified for the competition; thus they would be drawn towards the Society, and their interest in it stimulated.

But in reading the speeches delivered in the Council on the motion, one is driven to the conclusion, that members' minds are, at present, saturated with the one idea of the curriculum; almost all who spoke seemed to be afflicted with "compulsion on the brain;" and there seemed to be lurking in the minds of some, that this scheme would interfere with their educational project. I fail to see why it should; and while heartily approving of the curriculum, which I trust the Council will be successful in establishing, I cannot see why Mr. Leigh's scheme should not be adopted also. The two things are not antagonistic, but would, I think, serve quite different purposes. I presume the curriculum cannot be made contemporaneous with apprenticeship, and Mr. Leigh's idea, it seems to me, is to take hold of the youths during the time they are actually serving their apprenticeship, and not from the period when they have completed their term (still being apprentices of the Society), to the time of their Minor examination, and this is the time when studious habits, or otherwise, are formed, which tell upon after life.

I hope the Committee will give the matter thoughtful consideration, and see its way to recommend some such scheme for adoption. It would be well if the trade would express its opinion as far as possible. Walter Aston.

Sir,—I like the notion of the motion of Mr. Leigh. The scheme foreshadowed is, I consider, quite practicable, and contains the germs of a most beneficent reform. It is greatly to be hoped that it will not be allowed to expire in committee.

The proposition probably does admit "the existence of the evils which a curriculum is intended to do away with," but the curriculum embodied in the alterations in the bye laws proposed some years ago would not do away with all the evils this new scheme is intended to remedy.

We have at present only a very thin outline of the proposed examinations, but I imagine that there would not be much opposition to their being made compulsory, in the same way as the pupil teachers' examinations under the education code.

The idea of dividing the Minor examination was a step in the right direction, and the compulsory courses of lectures would no doubt have insured an increased amount of preparation; but the opposition these proposals met clearly places that scheme, at all events in its original form, outside the range of practical politics.

Apprenticeship examinations, with or without prizes, would probably pave the way for a curriculum, when in the shadowy future the chemical-curiosity-oil-shop-looking-windows of the present race of pharmacists shall have given place to the professional wire blind and the emblematic carboy. Southern Scott.

The Proposed Pharmacy Bill.

Sir,—I read with great interest the motion of Mr. Hampson at the last Council meeting, and consider it a step in the right direction, although on the subject of equality of title I agree with Mr. Martindale. I do not wish to throw mud at our Council, far from it; and long may it reign over us. Nevertheless, why should men who hold no qualification whatever, beyond that of having been born in time to get into business before examinations were compulsory, have a better right to legislate for us than those born in more recent years, and who by their own skill and brain power pass the qualifying examination. If Associates in Business be granted seats on the Council, they should not be allowed a voice in matters concerning pharmaceutical chemists, but leave those in the hands of men like the present Council, who might, so to speak, constitute an "Upper House," and still remain as "gods" amongst us. I would also suggest the exclusion of chemists, in addition to pharmaceutical chemists, from the jury lists. Surely in things professional as well as in general business matters, our interests are mutual with pharmaceutical chemists. John W. T. Morrison.

University Degree for Pharmacists.

Sir,—It is to be hoped that Professor Fraser's proposition *re* a University degree for pharmacists may be carried effectually to its greatest extent. There is one point, however, which may be worth mentioning respecting already qualified pharmacists and chemists, namely, that such persons should be admitted to examination without further compulsory curriculum, by this means encouraging the older as well as the younger members of the profession to obtain the double qualification.

It may not be altogether inopportune at the present for me to suggest an idea which has weighed considerably in my mind for some time past: it relates to the establishing of voluntary examinations by the Pharmaceutical Society in "sanitary science." That the science of sanitation has for years past occupied a prominent position, both educationally and domestically, there is no gainsaying; but that no examination exists suitable to the requirements of the chemist is equally certain. True, the Universities hold examinations in sanitary knowledge, but these are exclusively for medical practitioners; the Sanitary Institute also holds examinations, but these are for Surveyors and Inspectors of Nuisances, and treat principally of buildings; whilst the examinations (although including all points) held in hygiene by the Science and Art Department, South Kensington, are intended for students and teachers of that subject only. Let us hope that Mr. Carteighe, as President of the Society, may see his way clear to organize a scheme which may meet these requirements, and that it may not be considered unwise to ask Sir Douglas Galton, the President of the Sanitary Institute, to confer with the Pharmaceutical Council upon so important a subject. Frederick Davis.

The Sale of Poisons by Unqualified Persons.

Sir,—The latest mode of dealing in poisons by unqualified men, is to present the article asked for to their customers, informing them they cannot sell it but will give them some and the customer may give them something (the value, I suppose) in return. Are they not rendering themselves as liable as if they actually sold the poison? And will not the 15th section of the Pharmacy Act (new version) apply to them by so dealing, as it does to the apprentice or unqualified assistant? I consider the Society is at fault in the manner in which it carries out that section. At the present time an unqualified man has to be twice caught selling poisons before he is prosecuted. The first time he is informed that the Society has heard he is dealing in poisons, and at the same time cautioned not to do it again. If the Society has not power to prosecute on the first offence, then the bye-laws ought to be altered in order that it can do so. At the next election for the Council, this question ought to be put to each candidate—"Are you in favour of the prosecution of unqualified men for selling poisons on first offence?" and if the answer be in the negative, do not vote for him.

I dare say some of our higher brethren will say, "Take no notice of these unqualified men, the public will soon find them out and will not patronize them." But if the upper class chemists had their livings to scratch for in a low class district, amongst people who do not know the difference between an unqualified and a qualified man, and who do not care a straw what he is, so long as they can get what they want, then they would be as ready to cry out as we are.

What is wanted is a new Pharmacy Act, containing clauses prohibiting anyone dealing in drugs of any description, except duly qualified chemists. Then, and then only will the business be as it should. There will be a good living for us all, which would repay us for our time and money, now thrown away upon examinations. Make the business worth going in for and then enforce your curriculum. A Poor Chemist.

Lime Water.

Sir,—Mr. Ellwood asks me to refer again to his paper for the method of preparing supersaturated solution of calcium oxide, and I have done so, but as the method there recommended is that best calculated to obtain a strong solution of the soluble impurities present (especially potash and soda), I have not repeated this experiment, because I have pointed out this source of error before (*Pharm. Journ.*, vol. xiv., p. 579; see also p. 600, 619 and 677). However, if Mr. Ellwood will be good enough to send me a sample of his so-called supersaturated lime water, I shall be pleased to examine it.

Mr. Ellwood hurls two quotations at me. The first one, from a German work abstracted into the *Journal of the Society of Chemical Industry*, I have read long ago; but the term supersaturated is evidently very loosely used, and judging by the abstract—for I have not seen the original—no means were taken to avoid the known source of error. The other reference I cannot call a quotation, for it is a gross misquotation, and it is to be found at p. 550 (not 500) of the 'Proceedings of the Chemical Society for 1888,' where it is stated that the solubility of calcium hydroxide (not CaO, as Mr. Ellwood says), is 1 in 640, which is equal to 1 in 843 of the oxide, which tallies well with Dalton's Solubilities, which, according to my experiments, are extremely accurate. To paraphrase Mr. Ellwood's remark I may say that it would be a decided advantage to your readers if Mr. Ellwood, instead of confidently asserting or rather re-asserting fallacies regarding the erratic behaviour of lime, would not believe all that he sees in print and proceed to give it forth as fact.

I generally have the lime water bottled off a few days after it is made and tested, but have never found that it made the slightest difference, however long it stood upon the lime.

I must apologize for occupying so much of your space, but so many fallacies have been printed about the extraordinary behaviour of lime that I think it is very desirable that they should, when possible, be contradicted.

A. C. Abraham.

Notes on a Botanical Ramble in Cornwall, Scilly Isles, etc.

Sir,—Mr. White is right. The allium found near Kynance is undoubtedly *A. Schœnoprasum*, var. *Sibiricum*, and not *A. sphœrocephalum*, as stated.

With one or two exceptions I found all the plants mentioned by Mr. Balkwill and others besides, which might prove wearying to mention. The statice I found at Gunwalloe, *i.e.*, between the points mentioned by Mr. Balkwill, was *S. binervosa*, the sea lavender. *S. Armeria* was abundant everywhere I have not seen *S. Limonium* in the Lizard district. The *Thalictrum* that grows between the rocks with the *Allium sibiricum* is *T. minus*. It is also common in Kennack Cove.

I might mention, too, that the dwarf juniper is to be found on Bradanack Downs, where I came across two large and very prostrate masses of it. Cunnack, of Helston, was a well known botanical name, and I hope his fine herbarium is in good keeping. Wm. Baxter, Junr.

Errata.—On p. 483, col. ii., bottom line, *for* "D. and S. Sturge, of Birmingham," *read* "J. and E. Sturge, of Birmingham." On p. 492, col. ii., *for* "total sodium carbonate" *read* "total carbonate." On p. 493, col. i., lines 8 and 9, *omit* the words "and a process for purity."

J. McDerment.—*The Analyst* is published by Baillière, Tindall and Cox, King William Street, Strand.

Communications, Letters, etc., have been received from Messrs. Perry, Maiden, Wilkerson, Aston, Leigh, Forret, Long, Chamomile.

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